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No. 5

LAYING SHEET ASPHALT IN ELIZABETH

Use of Portable Road Asphalt Plant for a Forty-Thousand-Yard Job—Sizes of Gangs Used—Handling Materials
—Specifications for Base and Wearing Surface.



SHEET ASPHALT PAVEMENT ON BAYWAY, ELIZABETH.

The city of Elizabeth, New Jersey, during 1916 laid about 40,000 square yards of sheet asphalt, the contractor for which was the Continental Public Works Company of New York. The work embraced in the contract consisted of removing dirt and old macadam already on the street, rolling and compacting the sub-grade, laying six inches of cement concrete foundation, and placing on this one and one-half inches of binder and a one and one-half-inch wearing course.

The specifications called for a concrete foundation mixed 1/3/6. Pennsylvania cement was used in this, and the greater part of it was mixed by one No. 14 and one No. 16 Koehring street paver concrete mixers. The sand and stone used in the concrete were brought to Elizabeth by barges and delivered to the job by means of auto trucks. The stone was standard crushed trap

rock imported from the Hudson river quarries, and the sand was brought from Cow Bay, Long Island. They were unloaded from the barges to the trucks by floating derricks. The average haul from the barges to the job was about two miles. The hauling was done over the unfinished section of the road, over the sub-grade after it had been graded to proper crown and elevation and rolled; the hauling thus serving to further compact the sub-grade.

The specifications for the asphalt cement were practically those of the American Society of Municipal Improvements, requiring a penetration of between 44 and 75 at 77° Fahr.; a loss not exceeding 5 per cent when heated for five hours at 325° Fahr., and a penetration at the end of that time of at least one-half of that previous to the heating; a ductility at 77° Fahr. of not less than 30

c m. It was required that the binder contain between 4 per cent and 7 per cent of bitumen, soluble in carbon disulphide, that from 15 per cent to 30 per cent of the material pass a ten-mesh sieve, and from 20 per cent to 50 per cent pass a $\frac{1}{2}$ -inch screen; the percentage of the material passing the ten-mesh to be regulated in accordance with traffic conditions upon the street to be paved, and the percentage of bitumen to be regulated in accordance with the mesh composition.

The specifications for the wearing surface required between 9.5 and 13.5 per cent of bitumen, not less than 10 per cent passing a 200-mesh sieve and from 10 to 35 per cent passing an 80-mesh, with a total of between 10 and 35 per cent passing the 30, 20 and 10 mesh sieves; the other meshes also being specified. The minimum amount of bitumen to be used only in mixtures containing the minimum amount passing the 80-mesh, and the amount of bitumen to be increased as the amount passing this mesh increased. On streets of very light traffic the city surveyor could permit the use of a coarser mixture than that specified, but the surface mixture must contain not less than 6 per cent of mineral matter passing a 200-mesh sieve, and not less than a combined total of 18 per cent passing the 200, 100 and 80 mesh sieves.

As is the practice with this firm of contractors on all their work, the asphalt used was delivered in tank cars. It was heated in the tank by means of steam coils, and was then pumped by a Kinney rotary pump into asphalt kettles adjacent to the plant. In these kettles the asphalt was heated by means of coal fires, and from the kettles was delivered into the measuring boxes by means either of pumps or of ladles. The asphalt paving material was mixed by a 1,250-yard Cummer portable road asphalt plant, which the contractors have found specially suited for this type of work. The plant consists of a sand drum 54 inches in diameter and 13 feet long, with a capacity of 12 tons of dried sand per hour; a sand bin with two compartments having a total capacity of $6\frac{1}{2}$ tons and provided with a rotary screen; a measuring box on a two-beam scale so arranged that each ingredient can be weighed separately or combined; a steam jacketed mixer with a capacity of 7 cubic feet; an asphalt bucket on a double-beam scale with a capacity of 125 pounds. Sand was elevated by a chain bucket elevator, and another similar elevator was provided for raising the hot material. The asphalt plant was driven by a 40 h. p. Ames boiler and a 30 h. p. Vim engine.

The average plant crew consisted of about 20 men, who unloaded materials from the cars, fed them into the drier, attended to the asphalt kettles and supplied coal and dust when needed. These were in addition to the men on the platform attending to the operation of the mixer, weighing the mineral aggregate and the asphalt, and also the engineer, fireman and plant foreman.

The hot material was hauled to the street by Packard, Pierce-Arrow and Sauer trucks. The street crew which spread the asphalt consisted of from seven to ten shovelers, two rakers, two tampers and a foreman. A standard fire wagon for keeping the asphalt tools hot formed a part of the street equipment. When spread, the asphalt was rolled with a Kelley-Springfield tandem road roller giving between 200 and 300 pounds compression to the inch width.

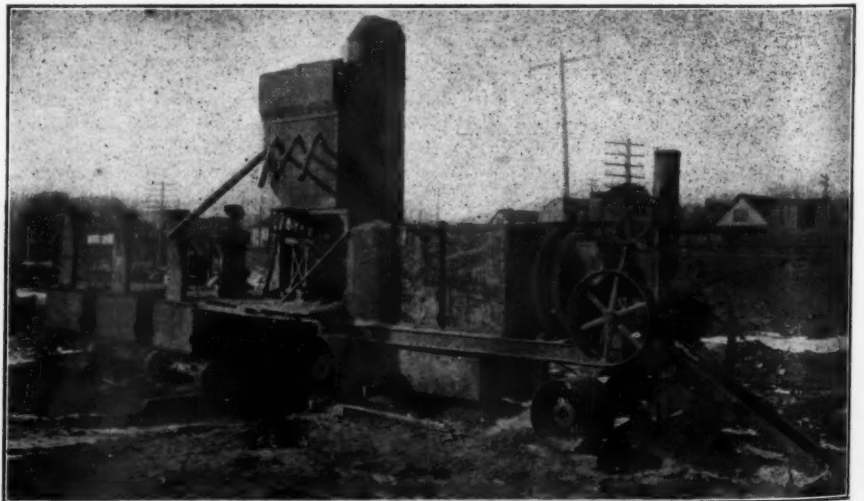
Work on this contract was started about the first of August, and was completed about the first of December. As was found on most other contract work in this vicinity last season, labor was scarce and of poor efficiency, and for these reasons the cost of all items where labor played an important part was unusually high.

SAND AND GRAVEL FOR ROAD PURPOSES.

A controversy concerning the proper method of selling sand and gravel has arisen between purchasers and producers of such materials and draws attention to the magnitude of the business. While there is no complete collection of figures regarding this industry, the United States Geological Survey compiles returns annually from a large proportion of the producers, and these show that in 1915 there was sold about 38,600,000 tons of sand at about \$13,500,000 and nearly 38,000,000 tons of gravel at about \$9,600,000. Although a large part of the gravel was used for road building, railway companies took large quantities for ballasting their tracks and a large quantity was required for concrete and building purposes, so it is impossible to do better than to guess at what proportion went into our highways. One such guess is 10,000,000 tons. In the case of sand, it is known from the way the records were obtained that about 3,382,000 tons of sand worth \$1,077,000 were used for paving purposes.

The controversy between purchasers and producers, to which attention was called, is due to a desire to change the method of selling sand and gravel. It is now sold generally by the cubic yard and is usually measured by the size of the wagon in which it is transported to the purchaser. There is a good deal of uncertainty as to the capacity of these wagons, because no two men will load a wagon with the same amount of sand or gravel.

A change is not acceptable to many purchasers. They contend that sand and gravel from different sources have different weights and point in proof to figures of the U. S. Geological Survey giving the average weight per cubic yard as anywhere from 2,500 pounds for Pennsylvania sand to 2,930 pounds for Washington sand, and from 2,680 pounds for Florida and Pennsylvania gravel to 3,065



ASPHALT PLANT USED ON ELIZABETH WORK.
Shown partly dismantled after completion of work.

pounds for Washington gravel. The U. S. Geological Survey dried 19 samples of Washington sand and weighed them carefully; their average weight was 3,020 pounds. A large amount of sand is damp when sold and the moisture will add considerably to the nominal weight of a cubic yard of such material.

FEDERAL ROAD FUNDS APPORTIONED.

The federal appropriation for the fiscal year ending June 30, 1918, of \$10,000,000 to aid the state in the construction of rural post roads has now been apportioned among the several states by the Secretary of Agriculture in accordance with the terms of the Federal Aid Road Act. Before making the apportionment the secretary, in accordance with the provisions of the act, deducted 3 per cent of the appropriation, or \$300,000, to meet the cost of administering the act. The remaining \$9,700,000 has been divided among the states as the act prescribes—one-third in the ratio of area, one-third in the ratio of population, and one-third in the ratio of mileage of rural delivery routes and star routes. Apportioned on this basis, the money is divided as follows:

State.	Sum Apportioned.
Alabama	\$208,297.80
Arizona	137,027.04
Arkansas	165,378.20
California	302,127.84
Colorado	167,380.28
Connecticut	62,180.88
Delaware	16,368.74
Florida	111,952.54
Georgia	268,658.96
Idaho	120,927.00
Illinois	441,852.46
Indiana	271,495.24
Iowa	292,351.20
Kansas	286,414.80
Kentucky	194,943.82
Louisiana	134,949.32
Maine	96,903.00
Maryland	88,094.44
Massachusetts	147,701.90
Michigan	291,567.44
Minnesota	284,788.12
Mississippi	177,811.68
Missouri	339,440.82
Montana	196,574.38
Nebraska	213,541.62
Nevada	128,796.60
New Hampshire	41,993.24
New Jersey	118,425.36
New Mexico	157,475.62
New York	501,440.54

North Carolina	228,763.84
North Dakota	152,286.12
Ohio	373,810.84
Oklahoma	230,278.00
Oregon	157,374.74
Pennsylvania	461,288.34
Rhode Island	23,331.42
South Carolina	143,615.28
South Dakota	161,892.04
Tennessee	228,306.96
Texas	583,855.62
Utah	113,900.30
Vermont	45,688.94
Virginia	199,321.42
Washington	143,768.56
West Virginia	106,540.92
Wisconsin	256,722.14
Wyoming	122,393.64

Total \$9,700,000.00

This is the second apportionment to be made under this act. For the fiscal year ending June 30, 1917, the appropriation was \$5,000,000. For the succeeding years the appropriation is as follows: 1919, \$15,000,000; 1920, \$20,000,000; 1921, \$25,000,000.

These sums do not include the \$1,000,000 which is appropriated each year for ten years for the development of roads and trails within or partly within the national forests.

LAYING BRICK ON OLD MACADAM.

Dixon, Illinois, recently voted a bond issue of \$82,500 for the purpose of resurfacing with brick a number of its macadam roads which are heavily traveled and have been worn out. Three sections, totaling 4.05 miles, are included in contract work which is now under way, these being the Lincoln Highway, east and west from Dixon, and the Colony road. The Lincoln Highway is being made 17 feet 3 inches wide, and the other road has a brick pavement 10 feet wide on either side of a 10-foot strip in which is a car track, which middle 10-foot strip is to be surfaced with crushed stone. The 3.05 miles of Lincoln Highway 17 feet 3 inches wide has been let for a



BRICK ROADWAYS ON MACADAM BASE.

total of \$53,300, and the Colony road for \$28,000.

The method of construction on each of the roads is practically the same. In each case the old macadam in place was used as a base, and was not disturbed except where it was necessary to add fresh stone in order to give a full depth of 6 inches. When such stone was added it was thoroughly rolled and the 6 inches secured after such rolling.

Upon this macadam as a base was spread a 2-inch sand cushion, and on this the brick were laid and grouted with cement filler. On the Lincoln Highway the brick pave-

ment is retained by a concrete edge 5 by 12 inches, and on the Colony road by a combined concrete curb and gutter on the outside of each paved stretch, and a 6 by 11 inch curb next to the car track.

Work on the Lincoln Highway stretch is in charge of H. T. Shaw as engineer, and Duffy & Hubbard and Rink & Schnell are contractors on the two sections of this road. The Colony road is being constructed by Duffy & Hubbard. L. B. Neighbors, superintendent of highways of Lee county, has general direction of all the work, and furnished the above information.

STREET PAVING IN 1916

ata From City Engineers and Other Officials Giving Amounts of the Various Pavements Laid in 1916.
Details of Construction and Cost.—Information for Contractors
Concerning Local Conditions in Hundreds of Cities.

In accordance with our regular practice for the past nine years, we present in this issue tables giving statistics concerning pavements laid in 1916 by a large percentage of the cities of the country. As before, this information (unless otherwise stated) has been furnished at our request by city engineers or other city officials, and to them belongs a large part of the credit therefor.

The number of cities reporting is greater than ever before, returns having been received from nearly 1,000 of them. In addition to the information furnished by the cities, the second part of Table No. 1, giving the amounts of certain kinds of pavement laid during 1916, were furnished by the Portland Cement Association, Warren Brothers Company and the Barber Asphalt Paving Company. All of the other paving organizations and companies were requested to send information of this kind, but these were apparently the only ones which had it available. Our object in asking information from these sources was that we desired to obtain all the reliable information possible, and we hoped that, by means of that obtained from these sources, we could supplement and make more nearly complete for the entire country the information which would be furnished by the cities themselves. Where information furnished by manufacturers or dealers applied to cities whose officials had sent in reports, the report of the official alone was used. The non-official information in most cases gives amount of contracts let, which was sometimes exceeded, and in other cases was not completed during the year. In general, however, where these duplicated official figures, the two were found to agree very closely.

Most of the information given has been tabulated, but certain classes of pavement were reported by so few cities that it did not seem desirable to include them in the main tables, and a statement of these pavements is given below. Also there were certain qualifications and variations from standard practice of which it was desirable to inform those studying the tables. This information is given either in the form of footnotes or in the running comment that begins a few lines below. This comment and the footnotes should be read in connection with the figures in the tables.

MISCELLANEOUS PAVING INFORMATION.

Included Under "Paving." In Savannah, Ga., contract prices given include grading, curbing and also catch basins when any are required.

In Rockford, Ill., the price given for macadam, \$1.17 a square yard, includes "curb and gutter, grading, storm sewer and everything."

In Wheaton, Ill., the price of bituminous macadam, \$1.73 a square yard, includes catch basins, drains, grading and curb and gutter. The average cost of pavement alone with an 8-inch foundation and a 2-inch wearing surface was \$1.02; curb and gutter 60c. a lineal foot, catch basins \$38 each and grading 40c. a cubic yard.

In Goshen, Ind., contract prices for paving include "grading, drain pipe, castings, man-holes, catch basins, advertising, engineering and inspection, and other expenses incident to said work." A bill for paving in Goshen might well be called an omnibus bill.

In Madison, Ind., price for brick paving includes cross drains, marginal curb, man-holes and inlets.

In Iowa Falls, Ia., engineering and incidentals in connection with asphalt concrete paving cost about 8c. a square yard.

In Larned, Kan., the brick and concrete pavement prices given do not include grading, which cost about 40c., an 8-inch curb and gutter which cost 50c., 6-inch curb and gutter costing 45c., nor headers which cost 25c.

In Rosedale, Kan., price given for concrete pavement includes curbing also.

In Lowell Mass., the cost of paving includes sidewalk regulation, catch basins, drainage and all incidentals.

In Waltham, Mass., the cost given of bituminous macadam includes excavating 4 inches of water bound macadam and 1 inch of gravel.

In Belding, Mich., the cost of pavement given includes grading, drainage and curbing.

In St. Johns, Mich., the cost of pavement given included grading, drainage, culverts, curb, headers, etc.

In Kirkwood, Mo., the price of water-bound macadam given included grading, inlets, and connections from inlet to sewer.

In Buffalo, N. Y., the cost of paving given included grading, curbing and drain tile.

In Findlay, O., the cost of paving included grading, curbing, engineering and inspection, and advertising.

In Hamilton, O., the cost of paving given included grading which averaged about 14 inches depth.

In Toronto, O., the cost of paving given included grading, curbs, catch basins and connections, engineering and inspection, and the base, a part of which was concrete and part slag.

In Jeannette, Pa., brick paving, including a 7-inch slag foundation, cost \$1.48, in addition to which the grading cost 17c. a square yard and the concrete curb averaged in with the pavement increased the average cost by 29c. a square yard.

(Continued on page 136.)

TABLE NO. 1.—PAVEMENTS LAID IN 1916.

Quantities are in square yards, except those designated as "mi.," which are miles.

	Sheet Asphalt.	Stone Block.	Frick.	Wood Block.	Con- crete.	Bit. Bitulithic.	Bit. Concr.	Waterb'd M'c'd'm.	Waterb'd M'c'd'm.	Gravel.
Alabama:										
Gadsden .....	..	..	..	..	..	..	18,000	..	..	70,000
Talledega .....	..	..	..	..	..	..	..	..	..	3 mi.
Arizona:										
Globe .....	..	..	..	..	..	..	..	..	3,755	..
Arkansas:										
Fayetteville .....	..	..	..	..	..	..	..	..	..	8,000
Ft. Smith .....	..	..	..	..	..	..	35,000	..	..	..
Hot Springs .....	..	..	..	..	..	4,000	..	..	..	1,000
Mena .....	..	..	..	..	..	..	..	..	..	1/4 mi.
Pine Bluff .....	..	..	..	..	..	..	..	..	..	..
California:										
Alhambra .....	..	..	..	..	..	..	..	3,480	..	..
Anaheim	72,298	..	..	..	..	..	..	..	..	..
Glendale	20,000	..	..	..	..	..	..	37,600	..	..
Long Beach	6,878	..	..	..	6,082b	..	15,413	5,094	..	..
Los Angeles	469,981	..	1,254	..	27,527	104,672	..	20,098	..	..
Marysville .....	..	..	..	..	34,468b	..	..	..	..	46,000
Ontario .....	..	..	..	..	187,963b	..	..	..	..	..
Pomona .....	..	..	..	..	..	..	..	1,872	..	..
Redondo Beach .....	..	..	..	..	22,750b	..	..	64,500	..	..
Riverside .....	..	..	..	..	36,000	..	..	..	..	..
Richmond .....	..	..	..	..	..	95,682	9,528	64,071	..	..
San Bernardino .....	..	..	..	..	42,539b	..	..	..	..	..
San Jose	55,000	..	..	..	..	..	..	..	..	32,000
San Louis Obispo .....	..	..	..	..	10,000	..	..	86,590	..	..
Santa Ana .....	..	..	..	..	22,646	..	..	42,415	..	..
Santa Monica	42,350	..	..	..	26,515	15,870	..	8,000	2,890	..
Sausalito .....	..	..	..	..	..	..	40,333	2,000	..	..
Vallejo .....	..	..	..	..	5,599	..	..	..	..	..
Colorado:										
Colorado Springs .....	..	..	..	..	..	..	..	..	..	700,000
Denver	63,000	12,000	..	..	12,000	25,000	25,000	..	..	280,000
Longmont .....	..	..	..	..	19,350	..	..	..	..	..
Pueblo .....	..	644	..	..	..	40,403	..	..	..	..
Connecticut:										
Ansonia .....	..	..	..	..	..	..	1,700	33,150	..	..
Bridgeport .....	..	..	..	..	..	290,714	..	59,945	..	..
Bristol .....	..	4,000	..	..	2,400b	..	..	7,250	..	..
Danbury .....	..	..	..	..	..	..	..	..	..	..
Greenwich .....	..	..	..	..	26,951	..	..	..	..	..
Hartford	2 mi.	..	..	..	1/4 mi.	..	..	..	3 1/4 mi.	..
Manchester .....	..	..	..	..	9,685	..	..	2,646	..	3,770
Mendon .....	..	..	..	10,784	15,169	..	..	7,933	..	..
New Canaan .....	..	..	..	..	..	2 mi. w	..	..	..	..
New Haven	110,284	..	..	47,095	32,750	..	..	23,679	..	..
Putnam .....	..	..	..	..	..	..	..	5,000	..	..
Simsbury .....	..	..	..	..	..	..	..	..	2 1/2 mi.	..
Wallingford .....	..	..	..	..	3,950	..	..	7,937	..	..
District of Columbia:										
Washington	154,076	2,663	..	..	16,658	..	..	9,766	..	9,744
Florida:										
Live Oak .....	..	..	1,368	..	..	..	..	..	670	..
St. Augustine .....	..	..	..	..	..	..	..	..	..	..
St. Petersburg .....	..	..	10.6 mi.	..	..	..	..	..	..	..
Tampa .....	..	..	49,700	..	3,823	..	..	18,203	..	..
Georgia:										
Americus .....	..	..	..	..	22,000	..	..	..	..	6 mi. a.
Brunswick .....	..	..	..	..	..	..	..	..	..	3,200
Cedartown .....	..	..	..	..	..	..	..	..	..	..
Gainesville .....	..	..	..	..	30,000	..	..	..	..	..
Tifton .....	..	..	..	..	..	37,000	..	..	..	..
Savannah .....	..	4,943	..	..	31,503	..	..	..	..	..
Idaho:										
Boise .....	..	..	..	..	4,142	46,648	..	..	..	..
Illinois:										
Alton .....	..	..	53,500	..	..	..	..	..	..	..
Amora	20,500	..	3,400	..	..	..	..	..	..	..
Belleville .....	..	..	..	..	66,000	..	..	..	..	..
Champaign .....	..	..	30,000	..	..	..	..	..	..	..
Chicago Heights .....	..	..	54,000	..	..	..	46,502	..	..	..
Decatur .....	..	..	85,561	..	..	..	..	..	..	..
De Kalb .....	..	..	14,475	..	..	..	..	..	..	..
Delavan .....	..	..	..	..	3,120	..	..	..	..	..
East St. Louis .....	..	15,700	3,933	6,542	10,000	..	..	..	..	..
Elgin .....	..	..	64,775	..	..	36,095	..	..	..	..
Evanston .....	..	..	89,472	..	2,278	23,627	..	16,816	..	..
Fairfield .....	..	..	20,400	..	..	..	..	..	..	..
Freeport .....	..	..	19,144	..	..	..	..	..	..	..
Galena .....	..	..	8,173	..	..	..	..	..	3,000	..
Galva .....	..	..	12,150	..	..	..	..	..	..	..
Granite City .....	..	..	..	..	11,580	..	..	..	..	..
Grayville .....	..	..	15,813	..	..	..	..	25,483	..	..
Harrisburg .....	..	..	48,215	..	..	..	..	..	..	..
Kankakee	17,000	..	25,000	..	..	22,000	..	..	..	..
La Grange .....	..	..	..	..	..	21,000	..	..	..	..
Lake Forest .....	..	..	21,000	..	1,000	5,500	..	22,500	..	..
Marion .....	..	..	33,750	..	..	..	..	23,733	..	..
Mattoon .....	..	..	32,500	..	..	..	..	..	..	..
Moline	36,509	..	12,850	..	1,386	..	..	..	..	..
Morrison .....	..	..	41,583	..	..	..	..	..	..	..
Normal .....	..	..	3,100	..	..	..	..	..	..	..
Oak Park	2,574	..	..	..	5,849	..	187,640	..	..	..
Ottawa .....	..	..	14,000	..	..	..	..	..	..	..
Harris .....	..	..	..	..	7,541	..	..	..	..	..
Peru .....	..	..	31,078	..	..	..	..	..	..	..
Pontiac .....	..	..	7,319	..	..	..	..	..	..	..
Robinson .....	..	..	4,600	..	..	..	..	..	90,503	..
Rockford .....	..	..	42,037	..	..	..	..	..	..	..
St. Charles .....	..	..	31,250	..	..	..	..	..	..	..
Springfield .....	..	..	17,664	7,670	1,706	..	..	..	..	..
Sterling .....	..	..	12,341	..	..	..	..	..	..	..
Streator .....	..	..	2 mi.	..	..	..	..	..	..	..
Wheaton .....	..	..	..	..	..	..	..	13,344	..	..
Indiana:										
Anderson .....	..	..	..	1.63 mi.	..	..	..	..	..	..
Angola .....	..	..	4,000	..	2,640	..	12,325	..	..	..
Connersville .....	..	..	..	..	35,500	..	..	..	..	..
Crawfordsville .....	..	..	..	..	..	..	..	4,116	..	..

For footnotes, see page 136.

TABLE NO. 1.—PAVEMENTS LAID IN 1916.—Continued.

Quantities are in square yards, except those designated as "mi.," which are miles.

	Sheet Asphalt.	Stone Block.	Brick.	Wood Block.	Con- crete.	Bitulithic.	Bit. Concr.	Bit. M'c'd'm.	Waterb'd M'c'd'm.	Gravel.
Indiana (continued):										
Crown Point .....	..	..	..	..	..	..	..	13,000	..	..
Decatur .....	..	..	..	..	..	..	..	..	1,067 c.	..
Elkhart	24,700	..	..	..	..	..	17,900	..	..	..
Fort Wayne	46,112	..	21,005	7,492	14,214	..	72,786	27,218	..	..
Frankfort .....	..	..	22,500	..	..	..	4,565	..	..	..
Franklin .....	..	..	1 mi.	..	..	..	..	..	..	..
Gary .....	..	..	..	..	..	..	..	6,500	2,500	..
Goshen	24,046	..	14,668	..	..	..	..	..	..	..
Greencastle .....	..	..	..	..	600	..	..	..	1½ mi.	..
Greenwood .....	..	..	..	..	12,500	..	14,000	..	..	..
Huntington .....	..	..	5,231	..	..	..	..	..	..	..
La Fayette	42,656	..	..	..	27,000	..	..	..	..	6,250
Laporte .....	..	..	..	..	..	..	..	..	..	..
Lebanon .....	..	..	5,356	..	2,602	..	..	..	..	4,535
Logansport	2½ mi.	..	..	..	..	..	..	..	..	..
Madison .....	..	..	13,000	..	..	..	..	..	..	..
Muncie	10,000	..	12,000	..	..	..	..	..	5,000	..
New Albany	14,000	..	15,400	..	1,210	..	..	..	36,000	..
Noblesville .....	..	..	69,480	..	112,134	..	..	..	..	18,000
Portland .....	..	..	39,600d.	..	..	..	..	..	..	..
Plymouth .....	..	..	21,000	..	..	..	..	..	..	..
Richmond	23,791	..	..	..	5,329	..	..	..	1¼ mi.	..
Seymour .....	..	..	..	..	..	..	..	..	8,400	1,500
South Bend	67,955	..	31,068	..	4,618	..	39,235	3,475	8,067	..
Sullivan .....	..	..	..	..	1,000	..	..	..	..	..
Terre Haute .....	..	..	2,200	..	..	..	..	..	..	..
Tipton	8,090	..	..	..	..	..	..	..	..	..
Vincennes	6 3-5 mi.	..	..	..	..	..	..	..	..	..
Wabash	17,000	..	2,575	..	..	..	..	..	..	..
West Lafayette .....	..	..	..	..	1,300b.	..	..	..	..	..
Iowa:										
Ames .....	..	..	..	..	..	118,000	..	..	..	..
Burlington .....	..	..	5,854	6,676	21,543	..	..	..	..	..
Cedar Rapids .....	..	..	5,000	..	1,100	..	35,000	..	3,000	..
Clinton .....	..	..	22,608	..	..	..	..	..	..	..
Cresco .....	..	..	..	..	4,000	..	..	..	..	..
Creston .....	..	..	..	..	2,006	46,972	..	..	..	..
Davenport .....	..	..	45,034	..	14,786	..	49,607	..	..	..
Eagle Grove .....	..	..	..	..	28,000	..	..	..	..	..
Grinnell .....	..	..	..	..	..	114,000	..	..	..	..
Indianola .....	..	..	..	..	52,069	..	..	..	..	..
Iowa Falls .....	..	..	..	..	1,400	..	51,000	..	..	..
Knoxville .....	..	..	..	..	..	13,000	..	..	..	..
Marshalltown .....	..	..	2,227	..	43,542	..	..	..	..	..
Muscatine .....	..	..	8,088	..	..	25,615	3,564	..	..	..
Oelwein .....	..	..	..	..	..	..	32,000	..	..	..
Oskaloosa .....	..	..	5,360	..	..	..	..	..	..	..
Perry .....	..	..	3,500	..	..	30,000	..	..	..	10 mi.
Sioux City	11,071	..	..	..	286,072	..	..	..	..	..
Spencer	43,000	..	..	..	..	..	..	..	..	..
Waterloo	17,493	..	..	6,415	..	..	..	..	..	..
Webster City .....	..	..	..	..	..	..	18,460	..	..	..
Kansas:										
Atchison .....	..	..	13,000	..	6,000	..	..	..	..	..
Caney .....	..	..	155	..	..	..	..	..	..	..
Dodge City .....	..	..	10,124	..	..	..	..	..	..	..
Girard .....	..	..	..	..	..	..	2¾ mi.	..	¼ mi.	..
Hutchinson .....	..	..	4.75 mi.	..	0.12 mi.	..	..	..	..	..
Iola .....	..	..	600	..	1,075	..	41,813	..	1,360	..
Larned .....	..	..	2,767	4,640	425	..	..	..	..	..
Manhattan .....	..	..	..	..	..	..	41,100	..	..	..
Neodesha .....	..	..	29,545	..	..	..	..	..	..	..
Newton	113,200	..	..	..	8,000	..	..	..	..	..
Olathe .....	..	..	2,700	..	..	..	..	..	..	..
Ottawa .....	..	..	18,718	..	..	..	..	..	..	..
Pittsburg .....	..	..	28,258	..	1,237	..	5,876	..	..	..
Rosedale .....	..	..	..	..	12,360	..	..	..	..	..
Salina .....	..	..	1 1-5 mi.	..	..	..	¾ mi.	..	..	..
Topeka .....	..	..	46,000	..	..	..	64,000	..	..	..
Wellington .....	..	..	..	..	..	..	80,074	..	..	..
Kentucky:										
Carlisle .....	..	..	..	..	..	..	..	..	8,785	..
Ft. Thomas .....	..	..	..	..	20,000	..	..	141,000	..	..
Lexington	45,863	..	..	..	1,161	..	..	..	..	..
Louisville	47,747	24,754	..	1,028	..	..	20,091	5,962	..	..
Maysville	16,000	..	27,000	..	..	..	..	..	..	..
Middlesboro .....	..	..	..	..	..	..	..	20,540	..	..
Paducah .....	..	..	..	5,524	..	..	..	..	..	4,244
Louisiana:										
Lake Charles .....	..	..	5,000	..	..	..	..	..	..	14,000
New Orleans	25,712	..	..	32,874	..	188,656	14,602	..	221,000	..
Shreveport .....	..	..	..	..	..	..	2 mi.	..	..	..
Maine:										
Bangor .....	..	..	..	..	..	..	..	18,296	..	..
Biddeford .....	..	3,500	..	..	6,000 h	..	..	..	..	..
Gardiner .....	..	..	..	..	..	..	..	..	..	4,670
Lewiston .....	..	7,990	..	..	..	..	..	..	..	..
Waterville .....	..	..	..	..	7,938h	..	3,620	..	..	17,710
Maryland:										
Baltimore	243,300	46,240e	15,670	2,100	2,200	..	..	..	..	..
Easton .....	..	..	..	..	6,263	..	..	..	..	..
Westminster .....	..	..	..	..	3,335	..	..	8,533	..	..
Massachusetts:										
Adams .....	..	..	6,250	..	..	..	..	..	..	..
Arlington .....	..	..	..	..	..	..	..	14,160	..	..
Boston	59,480	42,448	2,175	1,920	12,950	4,640	5,120h	119,198	26,516	..
Cambridge .....	..	5,523	..	970	..	10,310	..	59,050	..	..
Concord .....	..	..	..	..	..	..	..	19,190	177,469	1,778
Fitchburg .....	..	..	4,385	..	2,785h	..	..	22,000	..	2,600
Greenfield .....	..	..	..	..	..	..	..	3,000	3,000	2,400
Haverhill .....	..	4,498	..	..	..	..	..	44,183	..	..
Holyoke .....	..	..	1,772	..	19,774	..	..	..	..	..
Lawrence .....	..	8,596	..	..	..	..	..	2,430	..	..
Leominster .....	..	..	..	..	..	..	39,000	8,500	1,000	3,000
Lowell .....	..	12,982	..	..	..	..	..	36,384	13,285	14,351

For footnotes, see page 136).

TABLE NO. 1.—PAVEMENTS LAID IN 1916.—Continued.

	Asphalt. Sheet	Block. Stone	Brick.	Block. Wood	crete. Con-	Bitulithic.	Bit. Concr.	Bit. M'c'd'm.	Waterb'd M'c'd'm.	Gravel.
Massachusetts (continued):		1,152			53,202		2½ mi.	10,566	10,000	
Lynn								24,817		
Manchester								60,000		
Medford									6,000	8,000
Newton					13,000			60,000	15,000	30,000
North Adams		12,000						3,899		3,000
Norwood								25,000	1,100	
Peabody								4,000		
Quincy								7,755		
Wakefield								14,950	11,030	
Walpole								29,981		
Waltham								400		1 mi.
Watertown								4,232		
Webster								26,026		
Westfield	2,638	21,240								
Worcester								4,950		
Michigan:										
Adrian					4,048					
Alpina			11,607				63,940			
Ann Arbor			8,400				19,116			
Battle Creek			700		5,798					
Bay City			14,578							4,500
Belding									10,000	
Big Rapids			2,700		23,755					
Cadillac	254,761	36,755	74,685	117,419	28,689		541,291			
Detroit	104,000		3,620		7,000					12,960
Flint					54,003		14,110		5,000	19,982
Grand Haven	1,178		39,502				9,500			
Grand Rapids										
Holland			3,200				20,517			
Ionia			11,622							
Kalamazoo			8,200					5,110	2,780	1,270
Lake Odessa										
Marquette				350	5,997					
Monroe			28,000					15,706		
Mt. Clemens	7,810							13,900		
Muskegon							13,160			
Negaunee										
Petoskey			¼ mi.		½ mi.					¼ mi.
Port Huron	6,980									
Saginaw							13,912			
St. Johns					27,781					
Ypsilanti										43,832
Minnesota:										
Duluth				7,942		21,507	2,667	73,839		
Eveleth				982		20,004				
Fairmont				30,448	2,310	14,734				
Hibbing						4,686			2,500	1 mi.
Mankato					9,338					
Northfield				12,890				16,285		
Rochester				19,300	14,788					
St. Cloud				28,613		4,626				1.1 mi.
St. Paul	2,048	23,466g	10,059	27,585	2,200		91,790		9,387	8,800
Stillwater					6,000	18,640				6 mi.
Virginia										
West Minneapolis										5 mi.
Mississippi:					11,000					12 mi.
Columbus										853
Jackson			1,773							
Laurel	16,594		19,272							
Vicksburg	26,206									
Missouri:										
Bethany					18,000					
Boonville			2,636		2,100					
Cameron					26,607					
Cape Girardeau					18,065					
Caruthersville					11,000b			3,188		300
Fulton			2,449			6,000			6,000	
Hannibal					11,400				7,200	
Kirkwood					7,000					
Liberty										
Moberly			1,058							
Sedalia			12,295		7,462					
Warrensburg			8,000							
Montana:										
Anaconda							75,511		2 mi.	
Bozeman						34,794				
Butte					1,371	22,586				
Great Falls				67,258	25,641	185,985			11,300	19,058
Helena			1,550		2,500					
Livingston						5,379				
Nebraska:										
Fremont			20,809		45,422					
Grand Island			23,000							
Hastings	89,900									
Kearney	85,000		13,000				33,299	29,576f		
Lincoln	26,837		46,457		3,768		63,000			
Norfolk					42,000					
North Platte			44,104							
York			26,731							
New Hampshire:										
Franklin						2,676		4,817		15,100
Laconia								15,914		
Nashua		10,894i			6,240		3,000	25,000	3,000	10,000
Somersworth									4,500	
New Jersey:										
Atlantic City	10,780						5,300			
Bayonne	51,000	5,400				8,707		9,511		
Bloomfield							25,000		5,000	
Boonton			1,100						2,500	
Bordentown					700					
Camden	28,000	12,500								
Deal			50,773						5,993	
East Orange							7,900			
Hackensack										30,000
Long Branch									7,225	
Madison										13,200
Millville										
Montclair					4,000		56,782	7,497		

For footnotes, see page 136.

TABLE NO. 1.—PAVEMENTS LAID IN 1916.—Continued.

	Sheet Asphalt.	Stone Block.	Brick.	Wood Block.	Con- crete.	Bitu- lithic.	Bit. Concr.	Bit. M'c'd'm.	Waterb'd M'c'd'm.	Gravel.
New Jersey (continued):										
Orange .....	..	1,070g	..	..	..	..	..	..	1,853	..
Passaic .....	..	12,700	..	..	3,800	..	..	4,168	4,500	..
Paterson .....	..	..	..	..	..	..	..	..	2,110	..
Plainfield .....	..	..	..	..	..	..	..	..	15,000c	..
Ridgefield Park .....	..	..	18,000	..	..	..	..	9,000	30,000	..
Ridgewood .....	..	..	..	..	..	..	..	..	4,000	..
Rutherford .....	..	..	..	..	..	..	..	..	8,600	..
Summit	19,000	..	6,200	..	2,640	..	22,200	..	..	..
Trenton .....	..	..	..	..	11,292	..	..	..	..	..
Westfield .....	..	1,000	..	..	..	..	9,610	..	..	..
West Hoboken .....	..	4,680	..	..	..	..	10,137	..	..	..
West New York .....	..	..	..	..	..	..	..	..	15,000	..
West Orange .....	..	..	..	..	..	..	..	..	..	..
New Mexico:										
Albuquerque .....	..	..	..	..	..	..	..	..	2.4 mi	..
New York:										
Albany	40,125	90,296i	7,110	..	..	..	13,393	..	..	..
Albion .....	..	2,450	..	..	..	..	..	..	..	..
Amsterdam .....	..	3,200	6,000	..	..	..	..	10,000	20,000	..
Auburn .....	..	..	..	..	9,372	..	..	7,150	9,500	..
Binghamton .....	..	..	28,766	..	9,510	8,147	..	..	..	..
Bronxville .....	..	..	1,100	..	..	..	..	17,500	..	..
Buffalo	102,708	5,816	35,781	..	..	..	122,410k	..	..	..
Depew .....	..	..	16,426	..	28,087	..	..	..	3 mi.	..
Dolgeville .....	..	..	..	..	..	..	..	4-10 mi.	..	2-10 mi.
Ellenville .....	..	..	..	..	1,903	..	..	..	..	..
Elmira .....	..	..	28,372	..	..	10,644	..	..	..	..
Geneva .....	..	..	5,750	..	525 cu. yd.	..	..	..	..	..
Gloversville .....	..	..	..	..	..	13,657	..	..	7,308	..
Herkimer .....	..	..	..	..	1,310	8,680	..	..	2 mi.	..
Hudson .....	..	..	2,035	..	..	..	..	10,000	..	..
Little Falls .....	..	667	684	..	564	9,265	..	2,962	1,872	..
Lockport .....	..	..	3,900	..	1,870	..	..	..	..	..
Mamaroneck .....	..	..	4,154	..	..	..	..	..	..	..
Massena .....	..	..	..	..	..	..	..	..	2,000	..
Middletown .....	..	..	..	6,224	..	..	..	15,333	..	..
New York City:										
Bronx	70,235	49,170	..	..	..	..	44,096	..	..	..
Brooklyn	449,492	90,665i	..	..	..	..	17,252	..	..	..
Manhattan	328,171	86,778	..	18,176	..	..	..	..	..	..
Queens	68,500	24,780	..	1,140	..	..	93,900	45,600	97,800	..
Richmond .....	..	..	2,109	..	..	..	13,893	14,261	..	..
Niagara Falls .....	..	..	10,200	..	..	..	15,950	..	..	..
North Tonawanda .....	..	..	..	..	4,164	..	..	..	12,000	..
Ogdensburg .....	..	..	..	..	..	..	..	6,021	..	..
Olean .....	..	..	30,000	..	..	..	..	..	..	..
Oneida .....	..	..	..	..	..	4,874	..	..	..	..
Oneonta .....	..	..	..	..	..	..	..	..	1 mi.	..
Oswego .....	..	..	5,834	..	..	..	..	1,425	4,200	..
Plattsburgh .....	..	..	..	..	..	..	..	..	..	..
Port Jervis .....	..	..	5,586	..	..	..	..	..	..	..
Salamanca .....	..	..	22,560	..	13,542	..	11,200j	..	..	..
Sidney .....	..	..	1-10 mi.	..	..	..	..	..	..	..
Suffern .....	..	..	..	..	..	..	..	..	..	10 mi.
Syracuse	7,407	378	14,014	..	..	..	1,460	37,325k	..	..
Tuckahoe .....	..	..	..	..	..	..	..	24,000	..	..
Watertown .....	..	..	..	10,000	..	..	..	..	8,000	..
Waverly .....	..	..	..	..	6,479	..	..	..	..	..
North Carolina:										
Asheville	7,721	950	..	..	41,965	..	9,275	..	..	..
Burlington	20,000	..	..	..	3-5 mi.1	..	..	..	12,000	..
Charlotte .....	..	..	245	..	502	..	..	..	..	..
Durham	8,000	..	..	..	..	..	..	2,000	..	..
Gastonia	80,000	..	..	..	1 mi.1	..	..	..	..	..
Greensboro	6,000	..	..	..	3,364	18,790	..	..	..	..
Kinston	165,000	..	..	..	..	..	..	..	..	..
Monroe	2,600	..	..	..	..	..	..	..	..	..
Wilmington .....	..	..	..	..	..	..	..	6,000	..	15,000
North Dakota:										
Bismarck	150,000	..	..	..	..	44,625	..	..	..	..
Fargo .....	..	..	..	..	..	60,907	..	..	..	..
Grand Forks .....	..	..	..	..	9,739	..	..	..	..	..
Valley City .....	..	..	..	..	..	..	..	..	30,000	..
Ohio:										
Ada .....	..	..	2,245	..	..	..	..	..	2,400	..
Ashtabula .....	..	..	11,616	..	..	..	..	..	..	..
Barberton .....	..	..	7,309	..	..	..	..	..	..	..
Bellefontaine .....	..	..	520	..	4,200	..	..	..	..	..
Bucyrus .....	..	..	47,840	..	..	..	..	..	..	..
Cambridge .....	..	..	6,955	..	994	..	..	..	..	..
Cedarville .....	..	..	4,200	..	..	..	..	..	..	..
Cincinnati	2,560	65,269	9,468	34,175	4,197	10,913	..	4,386	5,718	..
Cleveland	1.11 mi.	0.76 mi.	19.35 mi.	0.08 mi.	0.56 mi.	0.88 mi.	0.34 mi.	0.15 mi.	..	..
Columbus	115,946	10,840m	124,006	..	..	..	..	3,785	..	..
Delaware .....	..	..	5,600	..	1,587	..	..	..	..	..
E. Liverpool .....	..	..	1,388	..	6,116	..	..	..	..	..
Eaton .....	..	..	38,000	..	..	..	..	..	..	..
Findlay .....	..	..	34,637	..	3,843	..	..	..	..	..
Fostoria .....	..	..	4,600	..	3,180	..	..	..	..	..
Franklin .....	..	..	..	..	..	..	..	..	2 mi.	..
Gallion .....	..	..	8,264	..	..	..	10,070	..	..	..
Granville	8,150	..	..	..	..	..	..	..	..	..
Hamilton	5,200	..	..	..	..	..	..	..	..	..
Kent .....	..	..	16,800	..	..	..	..	..	..	..
Lakewood	13,792	..	22,223	..	..	4,112	..	..	..	..
Lancaster .....	..	..	20,935	..	..	..	..	..	..	..
Lima	25,106	..	36,367	..	..	..	9,852	..	..	..
Logan .....	..	..	18,000	..	..	..	..	..	..	..
London	9,800	..	9,700	..	..	..	..	..	..	..
Lorain .....	..	..	15,302	..	..	..	..	..	..	..
Mansfield .....	..	..	17,634	..	..	..	..	1,821	..	..
Marletta .....	..	..	15,481	..	6,578	..	..	..	..	..
Marion .....	..	..	25,362	..	..	..	..	..	..	..
Massillon .....	..	..	3,000	..	..	..	9,800	..	10 mi.	..
Middletown .....	..	..	..	45,230	..	..	..	5,302	..	..
Mt. Gilead .....	..	..	5,300	..	..	..	..	..	..	..
Newark	18,858	..	30,510	..	..	..	13,243	..	..	..

For footnotes, see page 136.

TABLE NO. 1.—PAVEMENTS LAID IN 1916.—Continued.

	Sheet Asphalt.	Stone Block.	Brick.	Wood Block.	Con- crete.	Bitulithic.	Bit. Concr.	Bit. M'c'd'm.	Waterb'd M'c'd'm.	Gravel.
Ohio (continued):										
New Boston	45,000	..	..	20,000	15,889	24,594	3,800	..
Piqua	8,000	..	..	..	..	19,442	..	..
Ravenna	22,096	..	..	..	..	..	..	..
Salem	13,682	..	..	..	..	..
St. Clair
Springfield	53,000	..	14,000	13,000	..	..	19,600	..	..	..
Steubenville	10,424	..	..	..	..	..	..	..
Toledo	89,607	..	82,535	3,135	4,990	..	12,074	..	..	..
Toronto	1,766	..	..	..	..	..	..	..
Urbana	27,666	..	394	..	..	..	..	2,000
Troy	14,066	..	..	..	..	..	..	7,650
Washington C. H.	15,519	..	31,066	..	..	..	..	..	8,133	..
Xenia	25,000	..	4,000	..	..	..	..	..	..	3 mi.
Youngstown	46,192	..	..	15,843	..	..	..	..
Zanesville	21,377	..	4,480	..	..	..	..	..
Oklahoma:										
Bartlesville	16,000	..	..	..	..	..
McAlester	6,026	..	..	..	..	..
Norman	1,800	..	..	..	..	..
Sapulpa	26,292	..	..	..	..	..
Tahlequah	2,292
Oregon:										
McMinnville	49,360	..	..	..
Oregon City	20,500	..
Portland	8,338	10,730	..	46,528	..	..	..	1,997	..
Roseburg	2,792	..	..	..	..	..
Pennsylvania:										
Allentown	42,742	..	..	..	..	..	4,108j	..	..	..
Beaver Falls	10,000	..	..	..	..	..	..	..
Bethlehem	37,738j	..	..	..
Bradford	6,384	..	..	..	..	..	..	..
Butler	3,000	..	..	..	..	..	..	..
Carbondale	32,000	..	..	..	..	6,112	..	..
Chambersburg	2,100	..	..
Clearfield	13,000	..	..	..	..	..	..	..
Coatesville	370 cu. yds.	..
Connellsville	22,796	..	..	..	..	..	..	..
Cresson	7,000	..	..	..	..	..	..	..
Duquesne	2,090	..	..	..	..	..	..	..
Ellwood City	2,785	..	..	..	..	..	..	..
Erie	30,233	..	..	..	..	..	..	..	..	..
Farrell	11,002	..	..	..	..	..	..	..
Freeland	1,420	4,000
Greensburg	11,284	..	..	..	..	..	..	..
Harrisburg	10,233	..	..	..	..	10,361	..	..	..	..
Hazleton	5,750	..	5,269	..	..	..	..
Holidaysburg	3,502	..	..	..	..	..
Jeannette	10,724	..	..	..	..	..	..	..
Johnstown	14,088	..	1,373	..	1,566	..	..	..	..	..
Juniata	3,045	..	8,811	..	..	..	..	..
Kingston	8,150	..	..	..	..	..	..	..
Lancaster	3,537	..	..	..	..	..	3,408	..
Larksville	3,600	..	..	..	..	..	..	..	..	..
Lewisburg	13,210	..	..	..	..	..	..	..
McAdoo	5,040	..	..
McKeesport	1,880m	6,400	..	..	..	..	..	..	..
McKees Rocks	500	..	..	..	..	..	..	..	..
Meadville	2,550	..	..	..	..	..	..	..
Mt. Penn	7,600	..	..	..	..
Mt. Union	13,000	..	..	..	..	..	..	..
New Castle	1,95 mi.	..	..	..	..	..	..	..
Norristown	2,800	..	..	..	..	6,800	5,750	..
Northumberland	7,420	..	..	..	..	..	..	..
Oil City	729	..	..	..	..	..	..	..
Pittsburgh	68,990	30,000	7,000	6,700	2,000	..	..	..	..	..
Rankin	5,000	..	..	..	..	..	..	..
Robesonia	9,000	..	..	..
Royersford	7,200	..
Scranton	22,848	7,695	..	..	..	..	..	..	..	..
Sewickley	5,490	..	..	..	..	..	..	..
Somerset	2,064	..	..	..	..	..	..	..
South Fork	2,625	..	..	..	..	..	..	..
Waynesboro	7,292	..	..
West Homestead	6,885	..	..	..	..	..	..	..
West Reading	8,000	..	..	..	..
Wilkes-Barre	38,915	..	3,243	..	..	..	..	..	..	..
Williamsport	888	..	..	..	..	..	..	..
Womelsdorf	4,000	..	..	..	..	..
York	10,424	..	..	..	..	..	..	..	..	..
Rhode Island:										
Pawtucket	1,200	..	..	..	..	21,269	..	1/2 mi.	4-5 mi.
Providence	28,009	18,023	..	..	..	20,552	..	2,262	56,242	..
Westerly	40,000	..	..
Woonsocket	16,000	..	..	3,805	7,900	..	1 mi.	..	..
South Carolina:										
Charleston	52,277	..	..	..	..	..	..	..	..	..
Florence	12,936	..	..	..	..	..	..	..
Greenville	10,000	..	40,000	..	8,000	..	70,000	12,000c	..	..
South Dakota:										
Huron	3,410	..	23,883	..	..	..
Lead	1,597	..	..	..	1,333	..
Mitchell	4,745	..	26,512	..	..	67,725
Sioux Falls	20,692	..	..	9,606	42,734	84,243	..	..	..
Watertown	375	..	..	..	..	5 mi.
Yankton	61,395	..	..	..	..	..
Tennessee:										
Clarksville	15,692	..
Dyersburg	5,600	..	4,152	..	12,000	..	..	..
Jackson	23,382	..	..	..	..	..	..	..
Memphis	12,850	..	..	..	..	..	..
Union City	10,000	..
Texas:										
Austin	7,900n	..	..	..	..	60,143	..	37,000c	..	..
Clarksville	16,000	..	2,400	..	..	2,400	..	..
Corsicana	32,872	..	4,558	39,338p	64,718	3,938	..	3,260
Corpus Christi	48,341	..	4,000	..	..

* For footnotes, see page 136.

TABLE NO. 1.—PAVEMENTS LAID IN 1916.—Continued.

	Sheet Asphalt.	Stone Block.	Brick.	Wood Block.	Con- crete.	Bitu- lithic.	Bit. Concr.	Bit. M'c'd'm.	Waterb'd M'c'd'm.	Gravel.
Texas (Continued):										
Denison							11,665			
Houston	2,288		17,936				100,336	6,372		37,301
Pittsburg					12,000 ^p					
Texarkana				300						6,500
Utah:										
Logan					24,500					
Ogden	10,585				15,655		7,900			
Salt Lake City	125,932				36,508	40,452	13,734			
Vermont:										
Montpelier			308					4,170		9,500
Newport										1 1/2 ml.
Rutland			2,030						5,200	
Virginia:										
Danville		400			420			1,160		
Fredericksburg										20,156 ^r
Norfolk	42,421	7,098	1,832	811						
Staunton			5,000						19,000	
Washington:										
Bellingham	105,800				8,185					
Bremerton	1/2 ml.				7,000					1/2 ml.
Everett					12,500					
Ilwaco									1,777	
Mt. Vernon					5,705					
North Yakima							39,593			
Olympia	4,300									
Port Angeles					13,000					4 ml.
Pullman			504					12,445		
Puyallup										1 1/4 ml.
Raymond					6,600				1,666	
Spokane	51,779		1,133	5,169						
Walla Walla						19,675	67,166			
Wenatchee										2,200
West Virginia:										
Huntingdon			124							
Moundsville			5,096							
Parkersburg			40,857		2,100					
Wisconsin:										
Appleton		1,900	12,000							3 4-5 ml.
Beloit	54,909		14,488				8,561			
Burlington					372		8,310		7,600	1,000
Columbus							12,000			
De Pere							23,600			
Eau Claire					10,230			5,725		
Fond du Lac					4,810		22,375			
Glenwood City									1,000	
Janesville								14,388		
Jefferson			12,000		22,500			25,000		
La Crosse			5,521							
Lake Geneva										3,730
Madison	34,193			5,975	2,000		9,000			
Menasha					26,000					
Milwaukee	208,712	13,265	8,388	52,478	2,111		94,097			
Neenah					26,000					
New London					28,303					
Oshkosh			4,124		1,872		3,933		5,952	
Racine	20,767		38,958				5,578			
Sheboygan			3,762		53,033				6,605	
Stevens Point			14,226		6,269					
Superior					27,326					
Two Rivers								6,600		
Wausau			8,400					10,000		
West Allis				15,800	30,469					
Wyoming:										
Casper						17,000				
Canada:										
Brantford, Ont.					5,200				2,500	12,000
Charlottetown, P. E. I.									3,300	5,450
Galt, Ont.							6,840		6,650	
Kitchener, Ont.					6,040			11,014	5,000	
London, Ont.	47,080		3,290		4,420					
Ottawa, Ont.	37,416	6,489		6,146				413	3,318 ^c	
Regina, Sask.						443				
St. John, N. B.		587			3,040		1,560	3,539	11,000	
Sydney, N. S.								18,000		
Toronto, Ont.	78,183		41,200	1,206	19,712	21,171	8,114			
Victoria, B. C.	14,226				0.16 ml.				1 ml.	
Winnipeg, Manl.	5,820				552					

a—gravel and shell; one mile treated with tarvia; b—with bituminous top; c—with tarvia; d—laid by the county; e—35,240 square yards of this are redressed; f—asphaltic concrete resurfacing; g—laid by street railway company; h—Hassam; i—part is relaid granite block; j—Amlesite; k—asphalt repaving; l—car track work; m—relaid; n—rock asphalt; p—vibro-lithic; r—with asphalt surface binder; w—Warrenite.

In Corsicana, Texas, the costs of paving given included grading, 6 x 18-inch concrete curb and gutter, inlets and headers.

In Janesville, Wis., bituminous macadam cost \$1.05 without grading, inspection or other incidental work, and cost \$1.205, including all expenses.

In New London, Wis., the cost of concrete pavement given, which was done by municipal force, included a depreciation of \$1.027 on the roller, shovel, mixer, forms, etc., the grading, cleaning up after construction, and integral curb.

A number of cities included in the contract prices for paving any excavation required up to a depth equivalent to the thickness of pavement, this thickness including the base if there was any. In other words, if the original surface did not extend above the grade of the finished pavement, there was no additional price for excavation; but if it did so extend, the excavation about such grade was paid for extra. Such cities are Richmond, Ind., Ames, Burlington, Clinton, Denison, Grinnell, Iowa Falls, Marshalltown and Waterloo, Ia., Olathe, Kans., Fairmont,

(Continued on page 144.)

TABLE NO. 1.—PAVEMENTS LAID IN 1916.—Continued.

DATA FROM OTHER THAN MUNICIPAL SOURCES.

City.	Asphaltic concrete.	Bitu- lithic.	Con- crete.	Sheet asphalt.	Asphaltic concrete.	Bitu- lithic.	Con- crete.	Sheet asphalt.
Arizona:								
Ajo		18,705						
Douglas		33,871						
Flagstaff		11,261						
Phoenix		38,828						
Tucson		22,406						
Arkansas:								
Conway			300					
Eldorado			24,000					
Lake Village			8,000					
Little Rock		21,324						
Newport			450					
Russellville			2,700					
Vanburen			11,375					
California:								
Berkeley			20,000					
Brawley		9,636						
Corona			9,386					
Fresno		19,828	15,400					
Huntington Beach			65,800					
Manhattan Beach			8,664					
Newport Beach			29,000					
San Diego			11,420					
San Pedro		52,007						
Santa Cruz			15,640					
Venice								
Whittier		8,802						
Wilmington		5,764						
Woodland								
Colorado:								
Denver		24,474	43,013					
Fort Collins			24,338					
Littleton			7,483					
Pueblo		40,403						
Connecticut:								
Berlin			5,537					
Blanford			12,400					
Mystic			2,030					
Naugatuck			8,900					
Orange			5,400					
Stamford		4,624						
Stratford			6,169					
Washington			2,600					
Winchester		11,743						
Florida:								
Titusville			3,000					
Georgia:								
Athens			15,000					
Atlanta		9,195	15,700	29,350				
Fulton			10,000					
Griffin			1,000					
Macon			275,000					
Idaho:								
Blackfoot		47,091						
Idaho Falls		47,947	8,000					
Lewiston			3,760					
Orofino			5,550					
Illinois:								
Arlington Heights	97,790							
Batavia			337					
Berwyn	52,818							
Burlington			1,278					
Casey			4,185					
Chicago	171,300		15,000	1,490,010				
Chrisman								
Cicero	73,242							
Delavan			11,307					
Des Plaines	5,770							
Edwardsville			12,085					
Geneva				8,760				
Georgetown			34,300					
Glen Ellyn			45,643					
Harvard	42,550							
Howard			2,347					
Jacksonville				11,672				
Joliet	46,310							
Kenilworth			15,290					
Lake Bluff			6,800					
Lawrenceville			560					
Macomb			2,400					
Moline				16,960				
Park Ridge	9,525							
Peoria			10,305					
Quincy			2,371					
River Forest	5,700							
Riverside	44,425							
Rock Island	5,760			3,200				
Springfield	17,632							
Westville			17,000					
Winnetka			4,280					
Indiana:								
Atlanta			3,000					
Bloomington	26,394		6,797					
Columbus				18,000				
Evansville				112,938				
Indianapolis	104,479		14,564	338,153				
Kokomo			8,325	21,702				
Mentone			12,200					
Middletown			5,000					
Michigan City				5,755				
Mishawaka	6,200			8,000				
Newcastle			1,395					
North Manchester	13,148							
Rushville			1,833					
Warsaw				18,000				
Iowa:								
Akron							16,000	
Atlantic							28,409	
Audubon							2,260	
Bettendorf							2,718	
Carroll							610	
Cascade							5,500	
Cherokee								91,700
Clear Lake								27,000
Council Bluffs							29,395	
Des Moines	85,106	82,707					37,491	194,464
Dubuque	3,337						1,200	
Fort Dodge	30,044							
Fort Madison							18,058	
Greenfield							440	
Ida Grove							733	
Iowa City							2,650	
Jefferson		45,300						44,750
Keokuk							39,150	
Le Mars							55,000	
Mason City							47,000	143,932
Mt. Ayr							3,000	
Mt. Pleasant		24,969						
Nevada	41,000							
Oakland							20,000	
Sheldon							33,000	
Storm Lake							106,000	
Traer							15,800	
Vinton							15,350	
Washington							3,000	
Kansas:								
Bassett							4,642	
Clay Center								32,000
Concordia							3,900	
Eldorado	38,747							
Fredonia							604	
Galena							7,326	
Great Bend	41,800							
Herrington							333	
Hope							11,754	
Independence							466	
Kansas City	6,600	30,216					51,459	
Lawrence							2,804	
Leavenworth							2,049	
McPherson	7,000						2,450	
Peabody	22,000							
Pittsburg							1,240	
Tonganoxie							2,731	
Wichita							24,280	6,696
Kentucky:								
Covington								1,211
Mt. Sterling	10,000							
Massachusetts:								
Amesbury								
Chicopee	10,000							
Dedham		3,568						
Fall River		57,895						
Malden							9,400	
Southbridge							4,000	
West Springfield								
Michigan:								
Allegan							10,437	
Bangor							1,950	
Bellevue							9,300	
Bayne City							11,200	
Cassopolis							4,660	
Ecorse							17,813	
Fremont							9,775	
Gladstone							4,000	
Greenville							5,649	
Grosse Point	49,600						25,250	
Hastings							11,326	
Hillsdale	13,393							
Hudson	24,000							
Jackson	5,577							19,628
Lansing							1,647	
Otsego							365	
Pontiac	24,809						16,400	
Paw Paw							8,560	
River Rouge							14,200	
St. Clair							6,500	
St. Clair Heights							21,682	
Sault Ste. Marie		4,836						
Spring Lake	15,000							
Wyandotte							82,722	
Minnesota:								
Bemidji							6,000	
Brainerd							14,505	
Buhl		12,211						
Chisholm							12,000	
Gilbert		26,700						
Grand Rapids							6,120	
Minneapolis							2,000	
Pipestone							45,585	
Robinsdale							17,374	
Two Harbors							7,700	
Mississippi:								
Greenwood	17,142							
Missouri:								
Chillicothe							760	
Columbia							6,009	
Dexter							12,608	
Excelsior Springs							3,150	
Ferguson							3,169	
Illmo							9,309	
Jefferson City							2,789	
Joplin		15,411					55,948	
Kansas City	44,617						375,249	51,280

TABLE NO. 1.—PAVEMENTS LAID IN 1916.—Continued.
DATA FROM OTHER THAN MUNICIPAL SOURCES.

Kennett	6,370			Oregon:			
Kirksville	3,120			Astoria	30,830		
Maplewood	7,750			Myrtlepoint		17,000	
Monroe City	13,966			Oswego		1,305	
North Kansas City	24,670			Tillamook		20,000	
Poplar Bluff	5,983			Pennsylvania:			
Princeton	23,078			Altoona	2,929		
Springfield	8,525			Claysville		352	
St. Joseph	24,084	48,000		Du Bois		4,628	
St. Louis	6,984	82,446		Kentucky Square		2,840	
Tarkio	8,200			Lansdale		1,191	
Trenton	7,467			Lebanon	9,424	1,033	
Webster Grove	6,335			Manheim		14,500	
Montana:				Narberth		4,044	
Billings	33,073	4,400		Northampton		5,889	
Ft. Benton	11,609			Philadelphia	2,165		189,576
Lewistown	12,232			Pottstown		3,600	
Missoula	17,278			South Carolina:			
Nebraska:				Greenwood		4,500	
Beatrice	15,199			St. Petersburg		12,080	
Omaha		47,912		Sumter	10,581		6,000
Portsmouth		1,142		South Dakota:			
Superior		533		Vermillion		9,000	
New Hampshire:				Tennessee:			
Manchester				Knoxville	10,478		44,143
New Jersey:				Lenoir City	13,654		
Avenel		2,332		Murfreesboro	12,600		
Belleville	9,026			Nashville		55,342	1,014
Belmar		15,200		Newport	9,908		
Bridgeton		5,422		Texas:			
Harrison	20,067			Amarillo	55,000		
Hoboken			32,700	Clarksville		22,665	
Irvington	7,472	3,353		Dallas	27,748	30,397	70,450
Kearney	11,031			El Paso		251,334	2,900
Keyport		12,100		Forney			4,107
Neptune	10,729			Fort Worth		29,265	
New Brunswick				Galveston			1,255
Red Bank		22,194		Marshall			19,782
New Mexico:				McKinney			1,633
Las Vegas	6,342			Paris	22,413		
New York:				San Antonio	12,155	17,865	160,061
Dunkirk		9,817		Terrell			4,893
Endicott	23,163			Waxahachie	26,000		
Forestville		4,000		Wichita Falls			32,000
Gates		3,890		Utah:			
Glens Falls		14,800		Park City		543	
Gowanda		1,690		Vermont:			
Hempstead	9,276			Barre		1,760	
Johnson City	4,692			Proctor		1,000	
New Rochelle	16,705			Virginia:			
Port Henry		482		Brookneal		6,250	
Port Washington	20,500			Roanoke		10,300	
Rochester			78,170	Washington:			
Rome	25,332			Blaine		18,170	
Tonawanda		4,410		Chehalis		2,400	
Utica	42,093	1,100	5,600	Enumclaw		16,420	
Waterloo		21,834		Kent	22,229		
Whitehall	15,625			Prosser		5,600	
Yonkers	41,176			Ritzville		22,514	
North Carolina:				Winlock		14,164	
Albemarle	20,296			West Virginia:			
North Wilkesboro			23,000	Charleston	25,597	1,140	5,000
Raleigh				Wisconsin:			
Salisbury		2,600		Auburndale		1,990	
Shelby	26,232			Baldwin		1,828	
Weldon		10,000		Brodhead		860	
Wilson		40,000	120,000	Cuba City		4,440	
Winston-Salem		6,022		East Milwaukee		35,093	
North Dakota:				Elkhorn			33,569
Mandan	51,088			Ellsworth		1,200	
Minot	24,634			Grand Rapids		10,580	
Ohio:				Hilbert		7,396	
Akron		5,602		Johnson Creek		13,409	
Bexley	12,740	3,622		Juda		400	
Bowling Green		1,277		Kenosha	11,700	1,300	
Chicago Junction		11,320		Kohler		3,923	
Chillicothe	10,196			Marinette		10,760	
Cleveland Heights	84,945			Marshfield		16,352	
Dayton		6,963		Nekoosa		5,250	
Delta		3,884		Menomonee		10,168	
Dunkirk			15,100	New Glarus		8,672	
East Cleveland		6,088		Park Falls		5,081	
East View	28,300			Red Granite		2,595	
Euclid	27,365			Richland Center	36,313		
Hyde Park		1,066		Wautoma		1,272	
Ironton		6,518		Wauwatosa			4,570
Kenton	5,840			West Milwaukee		8,345	
Leroy		6,855		Weyauwega		5,549	
Oakwood		35,477		Wyoming:			
Painesville		908		Sheridan	2,470		
Rockford		24,981		Canada:			
Sandusky		3,114		Lindsay, Ont.	9,200		
Shaker Heights	93,694			Moncton, N. B.		13,646	
Shelby		2,500		Nanaimo, B. C.		3,888	
Shreve		560		N. Westminster, B.C.		3,346	
Sylvania		14,792		Port Coquitlam, B. C.		9,500	
Van Wert	13,774	3,467		Preston, Ont.	8,000		3,500
Wapakoneta	9,210			Regina, Sask.		3,799	
West Jefferson	3,770			Saanich, B. C.		132,280	
Westwood		695		St. Catharines, Ont.		2,528	
Oklahoma:				Saskatoon, Sask.		5,806	
Clinton			27,445	Sault Ste. Marie, Ont.		5,178	
Dewey		53,709		Sudbury, Ont.		19,510	
Oklahoma City			14,185	Vancouver, B. C.		352	
Poteau		1,127		Verdun, P. Q.		4,783	
Tulsa		12,155	29,987				

TABLE 2A.—CONSTRUCTION DETAILS AND COST.

	Stone Block			Brick or Clay Block		Crescoted Wood Block		
	Thickness of surface	Sheet Asphalt Thickness of binder	Cost per sq. yd.	Kind of filler	Depth of cushion	Kind of filler	Preservative Lib. of Preservative	Cost per yard
California:								
Anaheim	1½ to 2	1	\$1.23cbg	grout	...	grout	...	...
Long Beach	1½ to 3	1 to 1½	1.56bg	grout	...	grout	...	...
Los Angeles	1	1 to 1½	1.35cb	grout	...	grout	...	...
San Francisco	1½	none	1.915	grout	...	grout	...	...
San Jose	2	1	1.35cbg	grout	...	grout	...	...
Santa Monica	2	1	1.548cbg	grout	...	grout	...	...
Colorado:								
Denver	2	...	0.85	cement	...	grout	...	...
Pueblo	...	...	...	grout	...	grout	...	...
Connecticut:								
Bristol	1½	1½	1.58cb	grout	...	grout	...	...
Hartford	1½	1½	...	grout	...	grout	...	...
Meriden	...	...	...	grout	...	grout	...	...
New Haven	1½	1½	{ 1.00dg 1.84bg	grout	...	grout	18 1.10	{ \$2.78cbg 3.10cbg 2.55eg 3.14bg
District of Columbia:								
Washington	2½	2	{ 1.49b 1.665b	grout	...	grout	20 1.08-1.14	...
Florida:								
Live Oak	...	...	...	grout	...	grout	...	...
St. Petersburg	...	...	...	grout	...	grout	...	...
Tampa	...	...	...	grout	...	grout	...	...
Georgia:								
Savannah	...	...	...	grout	...	grout	...	...
Illinois:								
Alton	1½	1½	1.75cbg	grout	1	grout	...	...
Aurora	1½	1½	...	grout	2	grout	...	...
Chicago	...	...	...	grout	...	grout	...	...
Chicago Heights	...	...	...	grout	...	grout	...	...
Decatur	...	...	...	grout	...	grout	...	...
De Kalb	...	...	...	grout	1	grout	...	...
East St. Louis	...	...	...	grout	1	grout	...	...
Elgin	...	...	...	grout	2	grout	...	...
Evanston	...	...	...	grout	2	grout	...	...
Fairfield	...	...	...	grout	1½	grout	...	...
Freeport	...	...	...	grout	2	grout	...	...
Galena	...	...	...	grout	...	grout	...	...
Galva								
Harrisburg	...	...	...	grout	...	grout	...	...
Kankakee	1½	1½	1.79cb	grout	1½	grout	...	...
Lake Forest	...	...	...	grout	1½	grout	...	...
Marion	...	...	...	grout	1½	grout	...	...
Mattoon	...	...	...	grout	...	grout	...	...
Moline	2	1½	1.85cb	grout	...	grout	...	...
Morrison	...	...	...	grout	2	grout	...	...
Normal	...	...	...	grout	1½	grout	...	...
Oak Park	2	1½	1.82	grout	...	grout	...	...
Ottawa	...	...	...	grout	2	grout	...	...
Peru	...	...	...	grout	2	grout	...	...
Pontiac	...	...	...	grout	2	grout	...	...
Robinson	...	...	...	grout	4	grout	...	...
Rockford	...	...	...	grout	1½	grout	...	...
St. Charles	...	...	...	grout	...	grout	...	...
Springfield								
Sterling	...	...	...	grout	1	grout	...	...
Streator	...	...	...	grout	2	grout	...	...
Indiana:								
Angola	...	...	...	grout	1	grout	...	...
Crawfordsville	...	...	...	grout	2	grout	...	...
Elkhart	1½	1	1.80cb	grout	1½	grout	...	...
Fort Wayne	1½	1	1.70cb	grout	2	grout	...	...
Frankfort	...	...	...	grout	1½	grout	...	...
Franklin	...	...	...	grout	1	grout	...	...
Goshen	1½	1	...	grout	1½	grout	...	...
Huntingdon	1½	1	...	grout	1½	grout	...	...
Laporte	1½	1	{ 1.10cd 1.78cb	grout	...	grout	...	...

For footnotes, see page 144.

TABLE 2A.—CONSTRUCTION DETAILS AND COST.—Continued.

	Stone Block		Brick or Clay Block		Crescoted Wood Block	
	Thickness of surface	Sheet Asphalt Thickness of binder	Kind of filler	Depth of cushion	Kind of filler	Cost per yard
Indiana (Continued):						
Lebanon	1½	1	.....	2	cement	\$1.51
Logansport	1½	1	.....	1½	grout	1.95cbf
Madison	2	1	.....	2	grout	2.00cbg
Muncie	2	1	.....	1½	asphalt	1.82cb
New Albany	2	1	.....	2	grout	1.80cbfh
Noblesville	2	1	.....	5	grout	1.52cbg
Portland	1½	1	.....	1	sand	.....
Plymouth	1½	1	.....	1	.....	.....
Richmond	2	1½	.....	1	grout	2.14cba
South Bend	2	1½	.....	2	grout	2.30cba
Terre Haute	2	1½	.....	1	grout	1.75m
Lipton	2	1½	.....	1	grout	.....
Vincennes	2	1½	.....	1	grout	2.85acbg
Wabash	2	1½	.....	1	grout	2.17bg
Iowa:						
Burlington	1½ to 2	1	.....	1	sand	.....
Cedar Rapids	1½ to 2	1	.....	1½	asphalt	2.11cb
Clinton	1½ to 2	1	.....	1½	asphalt	2.20cbg
Davenport	1½ to 2	1	.....	1½	asphalt	1.95b
Des Moines	1½ to 2	1	.....	1½	cement	2.10
Marshalltown	1½ to 2	1	.....	1½	asphalt	2.28cbg
Muscatine	1½ to 2	1	.....	1	asphalt	1.86cbg
Oskaloosa	1½ to 2	1	.....	1	pitch	2.07b
Perry	1½ to 2	1	.....	1	.....	1.80cb
Sioux City	1½ to 2	1	.....	1	.....	.....
Spencer	1½ to 2	1	.....	1	.....	.....
Waterloo	1½ to 2	1	.....	1	.....	.....
Kansas:						
Atchison	1½ to 2	1	.....	1½	asphalt	1.45
Cane	1½ to 2	1	.....	1½	asphalt	3.20mbgi
Dodge City	1½ to 2	1	.....	1	asphalt	1.70cb
Hutchinson	1½ to 2	1	.....	1	asphalt	1.75
Iola	1½ to 2	1	.....	1	asphalt	2.10b
Larned	1½ to 2	1	.....	1 to 1½	asphalt	1.79cbj
Neodesha	1½ to 2	1	.....	1	asphalt	1.55cbk
Newton	1½ to 2	1	.....	1	asphalt	1.70cb
Olathe	1½ to 2	1	.....	1½	asphalt	1.60cbg
Ottawa	1½ to 2	1	.....	1½	asphalt	1.67cb
Pittsburg	1½ to 2	1	.....	1½	asphalt	1.80cb
Salina	1½ to 2	1	.....	1½	sand	1.55
Topeka	1½ to 2	1	.....	1½	asphalt	1.77cbg
Kentucky:						
Lexington	1½ to 2	1	.....	1½	.....	.....
Louisville	1½ to 2	1	.....	1½	.....	.....
Maysville	1½ to 2	1	.....	1½	.....	.....
Paducah	1½ to 2	1	.....	1½	.....	.....
Louisiana:						
Lake Charles	1½ to 2	1	.....	1½	.....	.....
New Orleans	1½ to 2	1	.....	1½	.....	.....
Maine:						
Biddeford	1½ to 2	1	.....	1½	.....	.....
Lewiston	1½ to 2	1	.....	1½	.....	.....
Maryland:						
Baltimore	1½ to 2	1	.....	1½	.....	.....
Massachusetts:						
Adams	1½ to 2	1	.....	1½	.....	.....
Boston	1½ to 2	1	.....	1½	.....	.....
Fitchburg	1½ to 2	1	.....	1½	.....	.....
Haverhill	1½ to 2	1	.....	1½	.....	.....
Holyoke	1½ to 2	1	.....	1½	.....	.....
Lewell	1½ to 2	1	.....	1½	.....	.....
Norwood	1½ to 2	1	.....	1½	.....	.....
Worcester	1½ to 2	1	.....	1½	.....	.....
Massachusetts (Continued):						
Adams	1½ to 2	1	.....	1½	.....	.....
Boston	1½ to 2	1	.....	1½	.....	.....
Fitchburg	1½ to 2	1	.....	1½	.....	.....
Haverhill	1½ to 2	1	.....	1½	.....	.....
Holyoke	1½ to 2	1	.....	1½	.....	.....
Lewell	1½ to 2	1	.....	1½	.....	.....
Norwood	1½ to 2	1	.....	1½	.....	.....
Worcester	1½ to 2	1	.....	1½	.....	.....

State	City	Material	Quantity	Unit	Price
Michigan	Ann Arbor	1.1 grout	2.00	...	...
	Battle Creek	grout	1.76mbg	...	...
	Bay City	grout	1.70cb	...	...
	Belding	grout	2.473cf	...	...
	Cadillac	grout	1.72mbg	...	...
	Detroit	grout	2.98mncbg	20	1.10
	Flint	grout	1.35mb	...	...
	Grand Rapids	grout	1.90cb	...	...
	Ionia	grout	1.86cb	...	...
	Kalamazoo	grout	2.085	...	...
	Lake Odessa	asphalt	1.88cb	...	...
	Monroe	grout	16	...	4.21
	Mt. Clemens	sand	1.43e	...	...
	Muskegon	grout	2.00cb	...	...
	Port Huron	grout	...	...	...
	Saginaw	grout	...	...	...
Minnesota	Duluth	grout	2.25cb	...	...
	Eveleth	grout	...	...	...
	Fairmont	grout	16	...	2.61b
	Northfield	grout	1.10	...	2.38cbg
	Rochester	grout	...	...	2.17cb
	St. Cloud	grout	16	...	2.41cb
	St. Paul	grout	16	...	2.41cb
Mississippi	St. Paul	asphalt	1.04	...	...
Missouri	Laurel	grout	2.30c	...	...
	Vicksburg	grout	2.00u	...	...
Nebraska	Booneville	sand	1.33cb	...	...
	Fulton	pitch	2.74cb	...	...
	Moberly	sand	1.66cb	...	...
	Sedalla	asphalt	1.65cbg	...	...
	Warrensburg	asphalt	1.66cbg	...	...
Montana	Great Falls	grout	2.65cb	16	3.77
Nebraska	Helena	grout	...	...	...
	Benson	asphalt	2.04cb	...	...
	Fremont	asphalt	1.97	...	...
	Grand Island	asphalt	1.94cbg	...	...
	Hastings	asphalt	1.97	...	...
	Kearney	asphalt	2.22cb	...	...
	Lincoln	asphalt	2.125cbg	...	...
	North Platte	asphalt	2.025cbg	...	...
	York	asphalt	...	...	...
New Hampshire	Nashua	grout	2.00d	...	...
New Jersey	Atlantic City	grout	3.75mb	...	...
	Bayonne	grout	2.80cbg	...	...
	Boonton	grout	4.30bg	...	...
	Deal	grout	3.00cb	...	...
	Paterson	grout	3.21cb	...	...
	Ridgewood	grout	2.36	...	...
	Trenton	grout	3.64cb	...	...
	West New York	grout	4.64cf	...	...
New York	Albany	grout	3.70cf	...	...
	Albion	grout	1.77cb	...	...
	Amsterdam	grout	...	...	...
	Binghamton	grout	...	...	...
	Bronxville	grout	...	...	...
	Buffalo	grout	...	...	...
	Depew	grout	...	...	...
	Elmira	grout	...	...	...
	Geneva	grout	...	...	...
	Hudson	grout	...	...	...
	Little Falls	grout	...	...	...
	Lockport	grout	...	...	...
	Mamaroneck	grout	...	...	...
	Middletown	grout	...	...	...
	New York City	grout	...	...	...
	Bronx	grout	...	...	...
	Brooklyn	grout	...	...	...
	Manhattan	grout	...	...	...
	Queens	grout	...	...	...
	Richmond	grout	...	...	...

For footnotes, see page 144.

TABLE 2A.—CONSTRUCTION DETAILS AND COST.—Continued.

	Sheet Asphalt		Stone Block		Brick or Clay Block		Creosoted Wood Block		
	Thickness of surface	Thickness of binder	Cost per sq. yd.	Kind of filler	Depth of cushion	Kind of filler	Cost per yard	Lbs. of Sp. Gr. of Preservative	Cost per yard
Niagara Falls	...	...	...	...	1	grout	\$2.90 cb	...	...
Olean	...	...	...	...	1 1/2	1:1 grout	2.45	...	...
Oswego	...	...	...	...	1 1/2	grout	2.05 b	...	...
Port Jervis	...	...	...	...	1 1/2	grout	2.61 cbg	...	...
Salamance	...	...	...	...	1 1/2	grout	1.84 cbg	...	...
Syracuse	2	1	\$1.68 cb	grout	1 1/2	grout	2.15 cb	...	...
Watertown	...	...	...	...	...	...	...	18	\$3.34 cbg
North Carolina:									
Asheville	1 1/2	1 1/2	1.81	...	...	...	...	...	...
Burlington	...	...	1.56 cbg	...	...	...	2.50 cb	...	...
Charlotte	1 1/2	1 1/2	...	...	...	...	...	...	...
Durham	1 1/2	1 1/2	1.72 cb	...	...	...	...	...	...
Gastonia	1 1/2	1 1/2	1.35 cb	...	...	...	...	...	...
Greensboro	1 1/2	1 1/2	1.50 cb	...	...	...	...	...	...
Kinston	1 1/2	1 1/2	1.65 cb	...	...	...	...	...	...
Monroe	1 1/2	1 1/2	1.80 clg	...	...	...	...	...	...
Ohio:									
Ada	...	...	...	...	1 1/2	grout	1.52 cd	...	...
Ashtabula	...	...	...	...	1 1/2	grout	1.73 cb	...	...
Barberton	...	...	...	...	1 1/2	monolithic	2.14 b	...	...
Bellefontaine	...	...	...	...	1	grout	1.95 b	...	...
Bucyrus	...	...	...	...	1 1/2	grout	2.79 cbg	...	...
Cambridge	...	...	...	...	1	grout	1.87 cb	...	...
Cedarville	...	...	...	...	1 1/2	grout	1.98 cb	...	...
Cincinnati	1 1/2	1 1/2	2.50 cbg	grout or pitch	1 1/2	grout or pitch	2.35 cbg	16	3.05 cbg
Cleveland	2	1	2.22 cb	grout or pitch	1	grout	2.34 cb	16	3.40 cb
Columbus	2	1-1 1/2	2.00 cb	...	...	grout	1.85 cb	...	...
Delaware	...	...	...	...	2	1:1 grout	1.73	...	...
East Liverpool	...	...	...	...	2	sand	1.56 cbg	...	...
Eaton	...	...	...	...	2 1/2	grout	1.90 bg	...	...
Findlay	1 1/2	1	...	...	2 1/2	grout	2.38	...	...
Fostoria	...	...	...	...	1	grout	1.99 cb	...	...
Gallion	...	...	...	...	1	grout	1.99 cb	...	...
Granville	2	1 1/2	1.50 cb	...	...	grout	1.99 cb	...	...
Hamilton	...	...	1.80 cbg	...	...	...	...	...	...
Kent	...	...	...	...	...	grout	1.95 cb	...	...
Lakewood	1 1/2	1	1.99 cb	grout	1 1/2	grout	1.84 cb	...	...
Lancaster	...	...	...	...	...	sand	0.923 cd	...	...
Lima	2	1	1.92 b	grout	1 1/2	grout	1.95 b	...	...
Logan	...	...	...	...	1 1/2	grout	0.95 cd	...	...
Lorain	2	2	1.97 cbg	grout	1 1/2	grout	1.87 cbg	...	...
Mansfield	...	...	...	...	1 1/2	grout	2.86 cb	...	...
Marletta	...	...	...	...	1 1/2	grout	2.36 cbg	...	...
Marion	...	...	...	...	2	asphalt	1.25 cdg	...	...
Massillon	...	...	...	...	...	sand	2.00 cb	...	...
Mt. Gilead	...	...	...	...	...	...	2.00 cb	...	...
Newark	1 1/2	1	0.84 d	...	...	1.74 b	1.74 b	...	...
New Boston	...	...	...	grout	1 1/2	grout	1.20	...	...
Orrville	...	...	...	grout	1 1/2	grout	1.60 b	...	...
Piqua	...	...	...	grout	1 1/2	grout	1.84 cbg	...	...
Ravenna	...	...	...	grout	1 1/2	grout	1.20	...	...
Salem	...	...	...	grout	1 1/2	grout	1.84 cb	...	...
Springfield	2	1	2.15 cbg	grout	1	grout	1.83 a	...	...
Steubenville	...	...	...	grout	1	grout	2.00 cb	...	...
Toledo	1 1/2	1 1/2	2.05	grout	1	grout	2.00 cbg	...	...
Troy	...	...	...	grout	2	grout	2.00 cbg	...	...
Urbana	...	...	...	grout	2	asphalt	2.73 cb	16	...
Washington C. H.	1 1/2	1	1.78 cb	sand	1 1/2	grout	2.73 cb	...	...
Xenia	1 1/2	1	1.98 cbg	grout	1 1/2	grout	1.90 bg	...	...
Youngstown	...	...	...	grout	1 1/2	grout	1.88 cbg	...	...
Zanesville	...	...	...	grout	1 1/2	grout	2.00 cbg	...	...
Oklahoma:									
Sapulpa	1	1 1/2	{ 1.80 cbg 2.10	grout	...	grout	1.61	...	...
Oregon:									
Portland	...	...	2.92 cb	grout	1	grout	1.70 cb	...	...

TABLE 2A.—CONSTRUCTION DETAILS AND COST.—Continued.

	Sheet Asphalt		Stone Block		Depth of cushion	Brick or Clay Block		Crescoted Wood Block	
	Thickness of surface	Thickness of binder	Cost per sq. yd.	Kind of filler		Kind of filler	Cost per yd.	Lbs. of Preservative	Sp. Gr. of Preservative
Pennsylvania:									
Allentown	1½ & 2	1	\$1.89-\$1.94cbg \$2.03cbg 1.57cp	grout	1	grout	2.30cb 2.60cbg 1.92cb 1.90mbg 2.39cbg 1.56cb 1.31cb	...	...
Bradford	2	1	1.80cbg	grout	1½	grout	1.59d 1.51cd	...	...
Butler	2	1	1.70cbg	grout	1	grout	1.46ca 1.78cb	...	...
Carbonale	2	1	1.70cbg	grout	1½	grout	2.37bg 2.95cb	...	...
Clearfield	2	1	2.36cbg	grout	1½	grout	2.12cbg 2.95b	...	...
Connellsville	2	1	2.36cbg	grout	1½	grout	2.80cbg 1.95cbg	...	...
Creason	2	1	2.00cb	grout	1½	grout	2.80b	...	...
Duquesne	2	1	1.85cbg	grout	1½	grout	2.32cb	...	...
Ellwood City	2	1	2.30cbg	grout	1½	grout	2.16	...	...
Erie	2	1	1.823cb	grout	1½	grout	2.10c	1.03-1.08	2.90cb 3.10cbg
Greensburg	2	1	2.04cbg	grout	1½	grout	1.92cb 2.45cbg	...	...
Harrisburg	2	1	2.00cb	grout	1½	grout	1.17cb	...	...
Hazleton	2	1	2.00cb	grout	1½	grout	2.29cb 2.34bg 2.35cbg	...	3.10cbg
Jennett	2	1	1.85cbg	grout	1½	grout	...	...	...
Johnstown	2	1	1.85cbg	grout	1½	grout	...	...	...
Junata	2	1	1.85cbg	grout	1½	grout	...	...	...
Kingston	2	1	1.85cbg	grout	1½	grout	...	...	...
Lancaster	2	1	1.85cbg	grout	1½	grout	...	...	...
Larksville	2	1	1.85cbg	grout	1½	grout	...	...	...
Lewisburg	2	1	1.85cbg	grout	1½	grout	...	...	...
McKeesport	2	1	1.85cbg	grout	1½	grout	...	...	...
Mt. Union	2	1	1.85cbg	grout	1½	grout	...	...	...
New Castle	2	1	1.85cbg	grout	1½	grout	...	...	...
Northtown	2	1	1.85cbg	grout	1½	grout	...	...	...
Northumberland	2	1	1.85cbg	grout	1½	grout	...	...	...
Oil City	2	1	1.85cbg	grout	1½	grout	...	...	...
Pittsburgh	2	1	1.85cbg	grout	1½	grout	...	...	...
Rankin	2	1	1.85cbg	grout	1½	grout	...	...	...
Scranton	2	1	1.85cbg	grout	1½	grout	...	...	...
Sewickley	2	1	1.85cbg	grout	1½	grout	...	...	...
Somerset	2	1	1.85cbg	grout	1½	grout	...	...	...
South Fork	2	1	1.85cbg	grout	1½	grout	...	...	...
Steelton	2	1	1.85cbg	grout	1½	grout	...	...	...
West Homestead	2	1	1.85cbg	grout	1½	grout	...	...	...
Wilkes-Barre	2	1	1.85cbg	grout	1½	grout	...	...	...
Williamsport	2	1	1.85cbg	grout	1½	grout	...	...	...
York	2	1	1.85cbg	grout	1½	grout	...	...	...
Rhode Island:									
Pawtucket	2	1	1.85cbg	grout	1½	grout	...	...	...
Providence	2	1	1.85cbg	grout	1½	grout	...	...	...
Woonsocket	2	1	1.85cbg	grout	1½	grout	...	...	...
South Carolina:									
Florence	2	1	1.55cbg	grout	2	grout	1.42cdg 1.39cbg	...	...
Greenville	2	1	1.55cbg	grout	1½	grout	...	...	...
South Dakota:									
Charleston	2	1	1.43	grout & bit.	...	grout	...	...	...
Sioux Falls	2	1	1.43	grout & bit.	...	grout	...	...	...
Tennessee:									
Jackson	2	1	1.44-2.98cb	grout	1	grout	2.05cbg	...	1.61cd
Memphis	2	1	1.44-2.98cb	grout	1	grout	...	...	...
Texas:									
Corpusana	2	1	1.84cb	grout	1	grout	2.37cbg 2.46cb	...	...
Houston	2	1	1.84cb	grout	1	grout	...	...	3.00cb
Texarkana	2	1	1.84cb	grout	1	grout	...	...	...
Utah:									
Ogden	2	1	1.95cb	grout	...	grout	...	...	...
Salt Lake City	2	1	1.04	grout	...	grout	...	...	...
Vermont:									
Montpelier	2	1	1.95cb	grout	1	grout	2.00md 3.30	...	...
Rutland	2	1	1.95cb	grout	1	grout	...	...	...
Virginia:									
Danville	2	1	1.40-1.70cbg	grout	...	grout	...	...	2.36cbg
Norfolk	2	1	1.40-1.70cbg	grout	...	grout	...	...	...
Staunton	2	1	1.40-1.70cbg	grout	...	grout	...	...	...

For footnotes, see page 144.

TABLE 2A.—CONSTRUCTION DETAILS AND COST.—Continued.

	Sheet Asphalt		Stone Block		Depth of cushion	Brick or Clay Block		Crested Wood Block	
	Thickness of surface	Thickness of binder	Cost per sq. yd.	Kind of filler		Kind of filler	Cost per yard	Lbs. of Preservative	Cost per yard
Washington:									
Bellingham	1 1/4	3/4	1.30cb	.....	.....	.....	.....	.....	.....
Bremerton	3	1 1/2	1.55cb	.....	.....	.....	.....	.....	.....
Olympia	2	none	1.16cb	.....	.....	.....	.....	.....	.....
Pullman	.....	.....	.....	.....	1 1/4	asphalt	3.35	.....	.....
Spokane	.....	.....	1.70	.....	.....	.....	2.00	.....	1.80
West Virginia:									
Huntington	.....	.....	.....	.....	8	sand	1.485cb	.....	.....
Moundsville	.....	.....	.....	.....	1-2	grout	1.80cbg	.....	.....
Parkersburg	.....	.....	.....	.....	.....	.....	1.87cb	.....	.....
Wisconsin:									
Appleton	.....	.....	.....	.....	.....	.....	.....	.....	.....
Beloit	1 1/2	1	1.30cb	grout	1 1/4	grout	2.20cbg	.....	.....
Jefferson	.....	.....	.....	.....	.....	asphalt	2.00cbg	.....	.....
La Crosse	.....	.....	.....	.....	2	grout	1.14cb	.....	.....
Madison	1 1/2-2	1	1.60cb	.....	.....	asphalt	2.19cb	.....	.....
Milwaukee	1-1 1/2	1 1/2	1.75cb	grout	2	grout	2.04cb	14	1.06-1.12
Oshkosh	.....	.....	1.89cb	.....	.....	.....	.....	12	1.10
Racine	2	1	1.99cbg	.....	2	grout	2.48cbg	.....	.....
Sheboygan	.....	.....	.....	.....	.....	asphalt	2.16cbg	.....	.....
Stevens Point	.....	.....	.....	.....	monolithic	.....	1.42cb	.....	.....
Wausau	.....	.....	.....	.....	.....	asphalt	2.02cbg	.....	.....
West Allis	.....	.....	.....	.....	1 1/2	.....	.....	12	1.07-1.12
Canada:									
London	2	1	2.05cbg	.....	.....	.....	2.71cbg	.....	2.35cb
Ottawa	2 1/2	1 1/4	2.10cb	grout	.....	.....	.....	14	1.09
St. John	2	1 1/2	1.26	pitch	.....	.....	.....	16	1.10-1.14
Toronto	2	1	1.43b	.....	1 1/2	grout	2.00	.....	3.80
Victoria, B. C.	2	1	2.795b	.....	.....	.....	.....	.....	.....
Winnipeg	2	1 1/2	.....	.....	.....	.....	.....	.....	.....

a—under railroad tracks; b—include base; c—by contract; d—on macadam, slag, sand or cinder base; e—on old base; f—includes curbs, catch basin, and everything; g—grading included; h—laid by county; i—2 layers of brick with sand between and all on 6-inch rock base; j—3-inch vertical fiber brick; k—2 1/2-inch vertical fiber brick; l—relaid; m—by municipality; n—gutters only; p—laid with 2 inches of concrete on old 5-inch concrete base from which old brick had been removed; r—repaving.

(Continued from page 136.)

Minn., Columbus, Miss., Bethany and Warrensburg, Mo., Hastings and York, Neb., Westfield and West New York, N. J., Bronxville, Bronx Borough, New York City, and Tuckahoe, N. Y., Cincinnati and Springfield, O., Bethlehem, Pa., Dyersburg, Tenn., Cleburne and Corpus Christi, Texas.

General. In Fort Smith, Ark., the only paving done in 1916 was bituminous concrete, all of which was placed over old brick or macadam roads as a base. This work is about completed and this year's work will be on a 4-inch concrete base.

Alhambra, Cal., is expecting to do extensive sewer work in the near future and consequently confined its 1916 work and will confine the 1917 work to necessary maintenance until the street excavation for sewer work has been completed.

Delavan, Ill., laid about 10,000 square yards of 6-inch reinforced concrete mixed 1:1 1/3:3, at a cost of \$1.33 a square yard, in one course. The grading cost 33 cents a cubic yard.

In Clarion, Ia., no paving will be laid before 1918, because the town has just completed a sanitary sewerage system this year. However, about four miles of street inside the corporation limits was graveled at a cost of about \$1,000 a mile, the money having been raised by popular subscription. This work was done on the main highways leading to the city, under the supervision of the Commercial Club.

In Stillwater, Minn., the two course 6 1/2-inch concrete pavement was reinforced with No. 28 triangular mesh. The total cost was \$1.40 a square yard, including excavation.

In Delaware, O., the cost of brick pavement includes \$1.07 for the brick, 9c for filler and 57c for 6-inch concrete base, proportion 1:3:6.

In Lima, O., cement filler for brick pavement costs from 14c to 15c a square yard, which was not included in the cost of pavement given.

Somerset Boro, Pa., bought the brick for its pavement construction last year at 80c a square yard, and contracted for the material and labor of grading, putting in the base and laying the brick for \$1.65 a square yard.

In Waynesboro, Pa., 6,122 square yards of 3-inch bituminous macadam was laid on an old macadam street as a base at a cost of 41c a square yard. In addition, 1,170 square yards was laid for which it was necessary to excavate 312 cubic yards at a cost of 57c a cubic yard, or 15c a square yard. A 6-inch stone base was used in the latter case, costing 23c a square yard. The total cost of the latter pavement was 62c a square yard.

In Providence, R. I., sheet asphalt, including grading and base, cost \$1.85, and including grading but not the base, cost \$1.35, both by contract. Granite block pavement, including grading and base, cost \$3.83 done by municipal force, and \$3.29 by contract; and the same kind of pavement, including excavation but not base, by municipal force, cost \$3.00.

In Florence, S. C., brick pavement was laid on the natural soil with a 2-inch sand cushion, no base being used.

In West Allis, Wis., one-course concrete pavement was built without curb at a cost of \$1.37; two-course pavement included integral curb, the cost being \$1.51.

Grading. Globe, Ariz., in connection with constructing 3,755 square yards of macadam, excavated about 800 cu. yds. at a cost of 54c. a cubic yard.

In Mena, Ark., the grading is done by the regular street force, and the paving by contract. The cost of grading was not included in the paving cost given.

(Continued on page 151.)

TABLE 2B—CONSTRUCTION DETAILS AND COST

City	Num- ber of courses	Concrete Thickness, inches	Cost per sq. yd.	Concrete, Bit. top. per sq. yd.	Bitulithic. Cost per sq. yd.	Thickness, inches	Concrete Cost per sq. yd.	Bituminous Macadam— Thickness, inches	Macadam Cost per sq. yd.	Waterbound macadam. Cost per sq. yd.	Gravel. Cost per sq. yd.
Alabama:											
Gadsden	1	6	.....	.....	.....	2	.....	.....	.....	.....	.....
Talladega	1	6	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tuscaloosa	1	6	\$1.25	.....	.....	.....	.....	.....	.....	.....	.....
Arizona:											
Globe	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas:											
Argenta	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fayetteville	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ft. Smith	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hot Springs	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Men	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mena Bluff	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
California:											
Glendale	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Long Beach	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles	1	5	1.26b*	.....	.....	.....	.....	.....	.....	.....	.....
Ontario	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pomona	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Redondo Beach	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Riverside	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Richmond	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Bernardino	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Jose	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Luis Obispo	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Santa Ana	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Santa Monica	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sausalito	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vallejo	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado:											
Colorado Springs	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Longmont	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pueblo	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut:											
Ansonia	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bridgeport	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bristol	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Danbury	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenwich	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hartford	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Manchester	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Meriden	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Haven	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Putnam	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simsbury	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wallingford	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
District of Columbia:											
Washington	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Florida:											
St. Augustine	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tampa	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia:											
Americus	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brunswick	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cedartown	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gainesville	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savannah	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tifton	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Idaho:											
Boise	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois:											
Belleville	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago Heights	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
De Kalb	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Delavan	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Elgin	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evanston	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Granite City	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....

For footnotes, see page 151.

TABLE 2B.—CONSTRUCTION DETAILS AND COST.—Continued.

	Concrete		Bitulithic		Bituminous Concrete		Bituminous Macadam		Waterbound macadam		Gravel	
	Num-ber of courses	Thickness, inches	Cost per sq. yd.	Cost per sq. yd.	Thickness, inches	Cost per sq. yd.	Thickness, inches	Cost per sq. yd.	Cost per sq. yd.	Cost per sq. yd.	Cost per sq. yd.	Cost per sq. yd.
Illinois (continued):												
Highland Park .....	..	..	.....	.....	2	\$1.70bh	2	\$1.05bh	.....	.....	.....	.....
Kankakee .....	..	..	.....	.....	2	1.50bh*	..	.....	.....	.....	.....	.....
La Grange .....	..	..	.....	.....	2	1.32b*	..	.....	.....	.....	.....	.....
Lake Forest	1	8	\$1.40bh*	.....	2	1.00ch*	3	.465ch*	.....	.....	.....	.....
Marion	1	7	1.30bh*	.....	..	.....	6 to 9	1.48bh*	.....	.....	.....	.....
Moline	1	6	1.47	.....	..	.....	.....	.....	.....	.....	.....	.....
Oak Park	1	7	1.67	.....	..	.....	.....	.....	.....	.....	.....	.....
Paris	1	8	1.42h*	.....	2	1.47	.....	.....	.....	.....	.....	.....
Rockford	1	7	1.35g*	.....	..	.....	.....	.....	\$1.17g*	.....	.....	.....
Springfield	1	7	1.35g*	.....	..	.....	.....	.....	.....	.....	.....	.....
Wheaton .....	..	..	.....	.....	..	.....	.....	1.73k	.....	.....	.....	.....
Indiana:												
Anderson	1	7	1.30	.....	2 1/2	1.79bg*	..	.....	.....	.....	.....	.....
Angola	1	7	1.32g*	.....	..	.....	..	.....	.....	.....	.....	.....
Connersville	2	..	1.35g*	.....	..	.....	..	.....	.....	.....	.....	.....
Crown Point .....	..	..	.....	.....	..	.....	..	.....	.....	.....	.....	.....
Decatur .....	..	..	.....	.....	2	1.60bg*	..	.....	.....	.....	.....	.....
Elkhart	2	7	1.52h*	.....	2 1/2	1.80h*	..	.....	.....	.....	.....	.....
Ellettsville .....	..	..	.....	.....	2 1/2	1.79bg*	3	.90b*	.....	.....	.....	.....
Frankfort .....	..	..	.....	.....	..	.....	..	.....	.....	.....	.....	.....
Gary	1	7	1.28bg	.....	2	1.75bg*	..	.....	.40g	.....	.....	.....
Greencastle	1	7	1.50g*	.....	..	.....	..	.....	.....	.....	.....	.....
Greenwood	1	7	1.28g*	.....	..	.....	..	.....	.....	.....	.....	.....
Lafayette	1	7	1.28g*	.....	..	.....	..	.....	.....	.....	.....	.....
Lebanon	1	7	1.20b*	.....	..	.....	..	.....	.....	.....	.....	.....
Noblesville	1	7	1.32h*	.....	..	.....	..	.....	.....	.....	.....	.....
North Vernon	1	8	1.50g*	.....	..	.....	..	.....	.....	.....	.....	.....
Richmond	1	7	1.20bh*	.....	2	1.45bh*	8	1.10h*	.80*	.....	.....	.....
Seymour	1	7	1.35bg*	.....	..	.....	..	.....	.60h*	.....	.....	.....
South Bend	1	7	1.35bg*	.....	..	.....	..	.....	.....	.....	.....	.....
Sullivan	1	7	.....	\$1.15g*	..	.....	..	.....	.....	.....	.....	.....
West Lafayette .....	..	..	.....	.....	..	.....	..	.....	.....	.....	.....	.....
Iowa:												
Ames	1	7	1.18bm*	.....	..	\$1.895bg*	..	.....	.....	.....	.....	.....
Burlington	1	7	1.35bg*	.....	2	.....	..	.....	.....	.....	.....	.....
Cedar Rapids	2	7	1.60bh*	.....	..	.....	..	.....	.....	.....	.....	.....
Clarion	2	7	1.45b*	.....	..	.....	..	.....	.....	.....	.....	.....
Cresco	1	6	1.90bh	1.89b*	..	.....	..	.....	.....	.....	.....	.....
Creston	1	6	{ 1.50bh	.....	..	.....	..	.....	.....	.....	.....	.....
Davenport	1	7	{ 1.35m*	.....	..	.....	..	.....	.....	.....	.....	.....
Denison	1	7 1/2	1.34	.....	2	1.671	..	.....	.....	.....	.....	.....
Des Moines	1	6	1.48	.....	..	.....	..	.....	.....	.....	.....	.....
Eagle Grove	1	7	1.405nb*	.....	2	1.93bm*	..	.....	.....	.....	.....	.....
Grinnell	1	6	1.48m*	.....	..	.....	..	.....	.....	.....	.....	.....
Indianola	2	7	1.29m*	.....	2	1.62bm*	..	.....	.....	.....	.....	.....
Iowa Falls	1	7	1.29m*	.....	..	.....	..	.....	.....	.....	.....	.....
Knoxville	1	7	1.83b*	.....	..	.....	..	.....	.....	.....	.....	.....
Marshalltown	1	7	1.83b*	.....	..	.....	..	.....	.....	.....	.....	.....
Muscatine	1	7	1.94b*	.....	..	.....	..	.....	.....	.....	.....	.....
Oelwein	1	7	.....	.....	..	.....	..	.....	.....	.....	.....	.....
Perry	1	6	{ 1.52g*	.....	..	.....	..	.....	.....	.....	.....	.....
Sioux City	1	7	{ 1.55g*	.....	..	.....	..	.....	.....	.....	.....	.....
Webster City	1	8	{ 1.83g*	.....	1 1/2	1.65bm*	..	.....	.....	.....	.....	.....
Kansas:												
Atchison	2	6	1.15h*	.....	2	.....	..	.....	.....	.....	.....	.....
Girard	2	7	1.35*	.....	2	.....	..	.....	.....	.....	.....	.....
Hutchinson	2	7	1.05h	.....	2	.....	..	.....	.....	.....	.....	.....
Iola	2	6	1.00h	.....	2	.....	..	.....	.....	.....	.....	.....
Larned	2	6	1.00h	.....	2	.....	..	.....	.....	.....	.....	.....
Manhattan	1	6	1.00h	.....	2	.....	..	.....	.....	.....	.....	.....
Newton	1	6	1.185	.....	2	.....	..	.....	.....	.....	.....	.....
Pittsburg	1	6	1.00m*	.....	2	.....	..	.....	.....	.....	.....	.....
Rosedale	1	6	1.00m*	.....	2	.....	..	.....	.....	.....	.....	.....
Salina	1	6	.....	.....	2	.....	..	.....	.....	.....	.....	.....
Topeka	1	6	.....	.....	2	.....	..	.....	.....	.....	.....	.....
Wellington	1	6	.....	.....	2	.....	..	.....	.....	.....	.....	.....

Kentucky:	Carlisle	1	6 1/2	1.55bh	.....	.....	7	1.25h	.....	5876ht	.....	.....
	Franklin	1	6	1.38g*	.....	.....	.....	1.10	.....	.....	.....	.....
	Lexington	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Madison	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Middlesboro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Louisiana:	Paducah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Lake Charles	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	New Orleans	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maine:	Shreveport	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Bangor	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Biddeford	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maryland:	Gardiner	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Waterville	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Baltimore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Massachusetts:	Easton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Westminster	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Boston	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan:	Concord	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Fitchburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Haverhill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Minnesota:	Holyoke	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Leominster	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Lowell	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mississippi:	Lynn	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Medford	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Newton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri:	North Adams	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Norwood	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Peabody	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New York:	Quincy	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Wakefield	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Waltham	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio:	Watertown	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Webster	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Westfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania:	Worcester	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Adrian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Alpena	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rhode Island:	Battle Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Bay City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Big Rapids	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Carolina:	Cadillac	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Detroit	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Grand Haven	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee:	Grand Rapids	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Holland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Kalamazoo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas:	Marquette	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Monroe	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Muskegon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Virginia:	Negaunee	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Petoskey	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Port Huron	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington:	Ypsilanti	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Duluth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Eveleth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wisconsin:	Fairmont	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Hibbing	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Mankato	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wyoming:	Rochester	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	St. Cloud	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Stillwater	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Zones:	Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Columbus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Jackson	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals:	Laurel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

For footnotes, see page 151.

TABLE 2B.—CONSTRUCTION DETAILS AND COST.—Continued.

[illegible]

New York City:									
Brooklyn	..	.....	.....	.....	.....	1.10h*	.....	.....	.....
Queens	..	.....	.....	.....	.....	1.75b	.....	.....	.....
Richmond	..	.....	.....	.....	.....	{ 1.00ch*†	.....	.....	.....
	..	.....	.....	.....	.....	{ 1.12c*	.....	.....	.....
	..	.....	.....	.....	.....	{ 1.25c†	.....	.....	.....
	..	.....	.....	.....	.....	{ 2.51b*	.....	.....	.....
Niagara Falls									
North Tonawanda	1	.....	.....	.....	.....	.....	.....	.....	.....
Ogdensburg	7	.....	1.58g*	.....	.....	.....	.....	.....	.....
Oneida	..	.....	2.45bg*	.....	.....	.....	.....	.....	.....
Oswego	..	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburg	..	.....	.....	.....	.....	.....	.....	.....	.....
Salamance	1	.....	1.56bg*	.....	.....	1.76bg*	.....	.....	.....
Tuckahoe	7	.....	.....	.....	.....	.....	.....	.....	.....
Watertown	..	.....	.....	.....	.....	.....	.....	.....	.....
Waverly	6	.....	1.36%g†	.....	.....	.....	.....	.....	.....
North Carolina:									
Asheville	1	.....	1.295g*	.....	.....	.....	.....	.....	.....
Charlotte	1	.....	1.28*	.....	.....	.....	.....	.....	.....
Durham	..	.....	.....	.....	.....	.....	.....	.....	.....
Gastonia	..	.....	2.00l	.....	.....	.....	.....	.....	.....
Greensboro	1	.....	1.05†	.....	.....	.....	.....	.....	.....
Wilmington	5	.....	.....	.....	.....	.....	.....	.....	.....
North Dakota:									
Bismarck	..	.....	2.38b*	.....	.....	.....	.....	.....	.....
Fargo	..	.....	2.136b*	.....	.....	.....	.....	.....	.....
Grand Forks	1	.....	.....	.....	.....	.....	.....	.....	.....
Valley City	7	.....	1.55*	.....	.....	.....	.....	.....	.....
Ohio:									
Ada	..	.....	.....	.....	.....	.....	.....	.....	.....
Bellefontaine	1	.....	1.38	.....	.....	.....	.....	.....	.....
Cambridge	6	.....	1.28h*	.....	.....	.....	.....	.....	.....
Cincinnati	1 to 2	.....	1.45m*	.....	.....	.....	.....	.....	.....
Cleveland	2	.....	1.75h*	.....	.....	.....	.....	.....	.....
Columbus	..	.....	.....	.....	.....	.....	.....	.....	.....
Delaware	1	.....	.93*	.....	.....	.....	.....	.....	.....
East Liverpool	1	.....	1.70*	.....	.....	.....	.....	.....	.....
Findlay	1	.....	1.92gn	.....	.....	.....	.....	.....	.....
Fostoria	1	.....	1.52l*	.....	.....	.....	.....	.....	.....
Gallion	..	.....	.....	.....	.....	.....	.....	.....	.....
Lakewood	..	.....	2.20b*	.....	.....	.....	.....	.....	.....
Lima	..	.....	.....	.....	.....	.....	.....	.....	.....
Mansfield	..	.....	.....	.....	.....	.....	.....	.....	.....
Marietta	1	.....	1.20*g	.....	.....	.....	.....	.....	.....
Massillon	6	.....	.....	.....	.....	.....	.....	.....	.....
Middletown	1	.....	1.36bg	.....	.....	.....	.....	.....	.....
Milford	7	.....	.....	.....	.....	.....	.....	.....	.....
Newark	..	.....	.....	.....	.....	.....	.....	.....	.....
Piqua	..	.....	1.88bh	.....	.....	.....	.....	.....	.....
St. Clair	1	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	7	.....	1.47*	.....	.....	.....	.....	.....	.....
Toledo	7	.....	1.62	.....	.....	.....	.....	.....	.....
Urbana	1	.....	1.40bg*	.....	.....	.....	.....	.....	.....
Washington C. H.	6	.....	.....	.....	.....	.....	.....	.....	.....
Xenia	..	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	..	.....	.....	.....	.....	.....	.....	.....	.....
Zanesville	7	.....	1.98b*	.....	.....	.....	.....	.....	.....
Oklahoma:									
Bartlesville	1	.....	.....	.....	.....	.....	.....	.....	.....
McAlester	1	.....	{ 1.40g†	.....	.....	.....	.....	.....	.....
Norman	6	.....	{ 1.24b*	.....	.....	.....	.....	.....	.....
Sapulpa	2	.....	1.30h*	.....	.....	.....	.....	.....	.....
Okmulgee	1	.....	1.54hl	.....	.....	.....	.....	.....	.....
Okemune	..	.....	1.24h*	.....	.....	.....	.....	.....	.....
McMinnville	..	.....	.....	.....	.....	.....	.....	.....	.....
Portland	6	.....	1.21h*	.....	.....	.....	.....	.....	.....
Roseburg	1	.....	1.15h	.....	.....	.....	.....	.....	.....
Pennsylvania:									
Allentown	..	.....	.....	.....	.....	.....	.....	.....	.....
Bethlehem	..	.....	.....	.....	.....	.....	.....	.....	.....
Carbondale	..	.....	.....	.....	.....	.....	.....	.....	.....
Freeland	..	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg	..	.....	.....	.....	.....	.....	.....	.....	.....
Hollidaysburg	2	.....	1.62g*	.....	.....	.....	.....	.....	.....
Lancaster	..	.....	.....	.....	.....	.....	.....	.....	.....

For footnotes, see page 151.

Janesville	7	1.35h*	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.30*g	1.45bh*	1.05h-1.
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a—per mile; b—includes base; c—does not include base; d—includes about 12 inches of grading; e—includes concrete base; f—includes grading; h—does not include grading; i—includes reinforcement; k—includes grading, curb and catchbasins; l—car track street; m—includes grading equivalent to thickness of pavement; n—includes curb; o—grading, sidewalk regulation, catch basin and drainage and all incidentals; p—including oiling with asphalt binder; q—includes tile drain; r—resurfacing; s—on old concrete foundation with 1½-inch asphalt binder; t—1½-inch surface with 1-inch binder on 5-inch base; 2-inch surface with no binder on 3-inch base; u—with 1-inch concrete base \$1.75; v—1-inch concrete base \$1.58; w—by contract; tby municipality.

(Continued from page 144.)

In Pomona, Calif., grading and shaping the road cost 23c. a square yard and paving with bituminous macadam an additional 51¼c.

Riverside, Calif., in its paving work last year was fortunate in arranging with a local brick yard to remove 12,000 cu. yds. of earth excavated in grading the roadway for paving, at no cost to the city, leaving only 4,000 yds. to be disposed of by the city, and this was used in filling low spots in the same street.

In Longmont, Colo., grading, which is not included in the pavement price, cost 38c. a cubic yard, or about 6c. a square yard.

In Ansonia, Conn., grading, which is not included in pavement price, cost 16c. a square yard, by contract.

In Wallingford, Conn., grading for a concrete road cost 15c. a square yard by contract.

In St. Petersburg, Fla., brick pavement was laid on a base of bricks laid flat, with a sand cushion. The price by contract, \$1.49, did not include grading, which was 25c. a cubic yard.

In Boise, Idaho, grading cost 70c. a cubic yard, which is included in the costs of pavement given.

In Granite City, Ill., grading cost 51c. a cubic yard, and integral curb 25c. a lineal foot, neither of which is included in the price for concrete pavement.

In Mattoon, Ill., excavation and grading, not included in the price, cost 30c. a cubic yard.

In Normal, Ill., grading, not included in price, costs about 30c. a cubic yard.

In Peru, Ill., grading, not included in price, costs about 50c. a cubic yard.

In Crown Point, Ind., the paving done last year involved an average of one foot cut and fill, with an average haul of 300 feet, and the cost of this work, not included in the price of pavement, was about 25c. a square yard.

In Neodesha, Kan., grading, cost 36c, and curb and gutter, 50c.

In Ottawa, Kan., grading not included in price, cost from 35c. to 50c. a cubic yard.

In Fort Thomas, Ky., grading, not included in price, cost 40c. a yard.

In Easton, Md., the price of concrete pavement given, \$1.84, includes 50c. a square yard for grading.

In Cadillac, Mich., the costs given include grading, which averaged about 8c. a square yard for the brick pavement, 12c. for the concrete and 6c. for the macadam. They did not include the concrete base under the brick pavement, which cost 53c.

In Northfield, Minn., grading cost 54c. a cubic yard, which was not included in the cost of paving given.

In Laurel, Miss., grading cost $7\frac{1}{2}\text{c}$. a square yard, which was included in the cost of pavement given.

In Cameron, Mo., the prices given include grading, which cost 11½c. a square yard on one contract, and 8c. on another.

In Nebraska City, Nebr., grading costs about 20c. a square yard.

In York, Nebr., excavation above the level of the curb is extra, and cost 40c. a square yard in addition to the contract price given.

In Ellenville, N. Y., the cost of paving given did not include excavation, which cost 34½c. a square yard.

In Port Jervis, N. Y., the cost of brick pavement given included excavation, which cost 50c. a cubic yard, or 21c. a square yard. 1,376 square yards of brick were laid along the street railway track on a foundation that was already in, at a cost of \$1.70 a square yard.

In Asheville, N. Car., most of the grading for concrete pavement was done by the city and the cost was not included in the cost of paving given.

(Continued on page 162.)

TABLE 3A—LOCAL DATA.

	For concrete	For bottom	For top course	Cost of	Cost of	Cost of	Cost of
	Type of stone	course macadam	Type of stone	macadam	unskilled	2-horse	team
		Type of stone			labor	and driver	per hour
					per hour		
Alabama:							
Gadsden	slag				\$0.15	\$0.40	
Tuscaloosa	gravel				1.25a		.35
Arizona:							
Globe	creek gravel				.75g		.37½
Arkansas:							
Argenta	trap				1.10y		.50
Fayetteville	flint				2.00y		.40
Fort Smith	sandstone				1.75a		.35
Helena	limestone				1.47v		.40
Hot Springs	best grade				1.25y		.50
Mena	limestone d				1.50yb		.35
Pine Bluff	trap and gravel				.15		.45
California:							
Alhambra	gravel or limestone				1.15y		.28
Anahelm	crushed boulders				1.50y		.62½
Glendale	crushed				.25		.55
Long Beach	trap				.75y		.62½
Marysville	trap				1.75y		.75
Ontario	granite				.25		.63½
Oxnard	mostly granite				.31½		4.50a
Palo Alto	crushed gravel				.25		4.75a
Pomona	crushed boulders				.90t		.62½
Redondo Beach	granite				1.25y		.83½
Riverside	feldspar				1.10y		.60
San Jose	gravel and porphyry				1.25y		.68%
San Bernardino	crushed gravel				1.00y		.55
San Francisco	sandstone or basalt				.65t		.55
San Luis Obispo	granite				1.50y		.81½
Santa Ana	gravel				.30		.30
Sausalito	trap				.37½		.80
Santa Monica	granite and trap				.25		.62½
Vallejo	trap				2.25 to 2.50a		5.00a
					.30 to 35		.70
Colorado:							
Colorado Springs	gold rock				.70y		.53
Denver	porphyry				.31		.52
Leadville	porphyry				.37½		.75
Longmont	trap				.25y		.62½
Monte Vista	pit gravel				.30		.60
Trinidad	trap and quartz				.20		.50
Connecticut:							
Ansonia	gravel				1.50y to 2.00y		.70
Bridgeport	trap				1.25y		.30
Bristol	trap				1.40y		.77 7-9
Danbury	trap				1.00y		5.00a
Danielson	trap				.30		5.55 5-9
Derby	gravel				.70		.70
Manchester	trap				1.25y		.66 2-3
Meriden	trap				.25		.57
New Canaan	trap or gravel				.28		.75
New Haven	½ in. to 2 in. trap				{ 1.50		.50
Putnam	native				{ 2.50y		.55
Simsbury	¾ in. trap				1.00t		.78
Wallingford	trap				{ .30		.67
District of Columbia:							
Washington	gravel				1.05y		4.50a
Florida:							
Fort Myers	flint limestone				1.75a		5.00a
Live Oak	limestone				1.75a		5.37½-.40
Penacola	black gravel				.15		4.50a
St. Augustine	granite and limestone				.20		.56
St. Petersburg	flint rock				16 2-3		.50
Tampa	flint rock				.15		.50
Georgia:							
Americus	gravel				1.30t		.40
Brunswick	granite or gravel				1.50t		.40-.50

Gainesville	limestone	1.65t	.....	.....	.....	1.25y	12½	40
Savannah	granite	2.66y	.....	.....	.....	.70y	13½	35
Tifton	slag	1.85t	.....	.....	.....	.83½y	12½	.....
Idaho:								
Boise	gravel	{ .90 to 1.00y	.....	.....	.....	1.00y	31½	.62½
Coeur d'Alene	gravel or lava	1.75y	.....	.....	.....	2.00y	25 to 30	.60
Twin Falls	gravel	1.75y	.....	.....	.....	1.10y	27½	50-55
Alton	limestone	1.25t	.....	.....	.....	2.00y	.30 to .35	.70
Aurora	gravel	{ 1.00 to 1.25t	.....	.....	.....	1.25y	25	.60
Belleville	limestone	1.25y	.....	.....	.....	1.00	27½	.....
Cairo	gravel or limestone	1.25y	.....	.....	.....	1.55y	32½	50
Champaign	gravel	1.85yc	.....	.....	.....	1.85y	30	60
Chicago Heights	gravel or limestone	1.45t	.....	.....	.....	1.85y	32½	.62½
Collinsville	limestone	1.45t	.....	.....	.....	1.85y	32	6.00a
Egin	gravel	1.60y	.....	.....	.....	1.20y	25	77 7-9
E. St. Louis	limestone	.85t	.....	.....	.....	1.50y	.25 to .30	.60
Evansville	gravel or limestone	1.20y	.....	.....	.....	1.15t	25	50
Fairfield	gravel	1.00t	.....	.....	.....	1.45y	25 to .30	50
Freeport	gravel	1.10y	.....	.....	.....	{ 1.75 to 2.25y	25 to .30	50
Galena	bank run gravel	2.25y	.....	.....	.....	1.20t	20 to 30	40
Galva	gravel	1.08t	.....	.....	.....	.60t	30	.....
Gibson	gravel	.60t	.....	.....	.....	1.00t	30	50
Gillespie	.....	1.25y	.....	.....	.....	1.30t	35 to .40	50
Granite City	limestone	1.03t	.....	.....	.....	1.60y	25	50
Harrisburg	limestone	1.35y	.....	.....	.....	1.60y	25	50
Highland Park	gravel and limestone	1.00t	.....	.....	.....	1.75	37½	57 7-9
Hillsboro	limestone	1.60y	.....	.....	.....	1.00y	22½	45-50
Lake Forest	gravel	1.35y	.....	.....	.....	1.00y	25	50
La Grange	limestone	.95t	.....	.....	.....	1.85y	30	50
Marion	limestone	.67t	.....	.....	.....	1.20y	20 to .25	40-50
Mattoon	gravel	1.10y	.....	.....	.....	1.00y	34½	75
Moline	gravel	1.20t	.....	.....	.....	1.20y	20 to .25	40-50
Normal	limestone	1.25y	.....	.....	.....	1.00y	25	50
Oak Park	gravel or limestone	1.75y	.....	.....	.....	1.85y	35 to .40	45
Ottawa	gravel and stone	1.25y	.....	.....	.....	1.15y	25	73 1-3
Paris	gravel	1.10y	.....	.....	.....	1.10y	25	50
Peru	stone or gravel	1.35y	.....	.....	.....	2.00y	37½	66
Pontiac	stone or gravel	.85t	.....	.....	.....	1.50y	22 to .28	50
Pontiac	gravel	1.05y	.....	.....	.....	1.30y	34½	75
Streator	gravel	1.00y	.....	.....	.....	1.60y	30	50
St. Charles	gravel	1.15 to 1.40y	.....	.....	.....	1.20y	20 to .25	40-50
Taylorville	gravel	1.25y	.....	.....	.....	1.00y	28	50
Waukegan	gravel or limestone	1.10	.....	.....	.....	1.85y	30	50
Wheaton	.....	1.10	.....	.....	.....	1.85y	30	50
Indiana:								
Anderson	gravel	1.25 to 1.50y	.....	.....	.....	.80y	22½	40
Angola	gravel	1.25y	.....	.....	.....	1.25y	25	50
Bedford	limestone	1.25y	.....	.....	.....	1.75y	25	40
Connersville	gravel	.75y	.....	.....	.....	1.00y	25	45
Crawfordsville	gravel	1.05y	.....	.....	.....	.75y	20	40
Crown Point	gravel	1.00y	.....	.....	.....	1.20y	25	50
Decatur	gravel	1.00y	.....	.....	.....	1.10y	20	50
Elkhart	gravel	.95t	.....	.....	.....	1.00y	25	50
Fort Wayne	limestone	.85t	.....	.....	.....	1.35y	30	50
Frankfort	gravel	1.00y	.....	.....	.....	{ 1.00y to 1.60y	25	45
Franklin	stone and gravel	.85y	.....	.....	.....	.75y	20	40
Gary	gravel or limestone	.95t	.....	.....	.....	1.15y	35	60
Goshen	gravel	1.00y	.....	.....	.....	1.80t	25	50
Greencastle	gravel	1.00y	.....	.....	.....	1.25	20	40
Greenwood	gravel and limestone	1.50t	.....	.....	.....	1.25	25	40-50
Huntington	blue limestone	1.20y	.....	.....	.....	1.00y	25	45
Lafayette	gravel	.92t	.....	.....	.....	1.00y	25	45
Lebanon	gravel	1.15y	.....	.....	.....	1.25y	25	45
La Porte	gravel	.95y	.....	.....	.....	1.25	25	45
Logansport	gravel	.90y	.....	.....	.....	1.00y	25	40
Madison	limestone	1.00t	.....	.....	.....	1.15y	20	40
Muncie	gravel	1.20y	.....	.....	.....	1.00y	20	40
New Albany	gravel	1.10y	.....	.....	.....	1.00y	20	40
Noblesville	gravel	1.25y	.....	.....	.....	.75y	20	40
North Vernon	gravel	.90 to 1.05t	.....	.....	.....	1.10	17½	35
Peru	limestone	.75t	.....	.....	.....	1.25y	20 to .25	40
Portland	gravel	.75t	.....	.....	.....	1.00y	20	40-45
Plymouth	limestone	.75t	.....	.....	.....	1.00y	20	40-45
Richmond	gravel	.75t	.....	.....	.....	1.25y	22½	45

For footnotes, see page 161.

TABLE 3A—LOCAL DATA.

	For concrete	For bottom	For top course	Cost of	Cost of	Cost of
	Type of stone	Type of stone	Type of stone	unskilled	2-horse	team
	Cost	Cost	Cost	labor	and driver	per hour
				per hour		
Indiana (continued):						
Seymour	gravel or limestone	limestone	limestone	\$1.00y	1.00y	\$0.40
Shelbyville	gravel	limestone	limestone	.75y	.90t	.40
South Bend	gravel	limestone	limestone	1.00y	1.10y	.55
Sullivan	gravel	limestone	limestone	1.00y	1.00y	.50
Terre Haute	gravel	limestone	limestone	1.00y	1.15y	.50
Lipton	gravel	limestone	limestone	1.10y	1.20y	.45
Vincennes	gravel	limestone	limestone	.75y	.75y	.40
Wabash	limestone	limestone	limestone	.90y	.75y	.40
West Lafayette	gravel	limestone	limestone	.75y	1.00y	.45
Iowa:						
Ames	limestone	limestone	limestone	2.00y	1.00y	.55
Bloomfield	crushed stone	limestone	limestone	.92t	1.00t	.40
Burlington	gravel	limestone	limestone	2.00t	1.00t	.45
Clear Rapids	limestone	limestone	limestone	1.50y	1.50y	.62½
Clinton	all materials have to be shipped in	limestone	limestone	1.50y	1.50y	.50
Crescent	gravel	limestone	limestone	1.75y	1.50y	.50
Davenport	limestone	limestone	limestone	1.75y	1.50y	.45
Des Moines	local limestone	limestone	limestone	1.00y	1.00y	6.00a
Eagle Grove	granite	limestone	limestone	1.15t	1.00y	.50
Grinnell	limestone	limestone	limestone	2.43y	.90y	.45
Indianapolis	limestone	limestone	limestone	1.20t	1.20t	.45
Iowa Falls	limestone	limestone	limestone	1.90t	1.80t	.45
Kearney	limestone	limestone	limestone	1.75y	2.20y	.45
Marshalltown	gravel	limestone	limestone	1.40t	1.10y	.50
Muscatine	gravel	limestone	limestone	1.70y	.67t	.50
Oelwein	limestone	limestone	limestone	1.30y	.90y	.50
Perry	gravel	limestone	limestone	1.00y	1.25y	.45
Sumner	gravel	limestone	limestone	1.00y	1.00y	.60
Waterloo	limestone	limestone	limestone	1.80y	2.74y	.50
Waverly	limestone	limestone	limestone	1.25t	1.00y	.45
Webster City	gravel	limestone	limestone	1.25y	1.00y	.45
Kansas:						
Abilene	limestone	limestone	limestone	1.90y	1.85y	.50
Atchison	limestone	limestone	limestone	1.45t	1.20t	.45
Dodge City	local gravel	limestone	limestone	.80y	.60y	.50
Girard	Joplin cherts	limestone	limestone	80t	1.00t	.52½
Hutchinson	limestone and chert	limestone	limestone	1.70t	.60y	3.50a
Iola	2-in. limestone	limestone	limestone	1.85t	.85	.45
Larned	gravel	limestone	limestone	1.85t	1.00y	.50
Manhattan	gravel	limestone	limestone	1.85y	1.25y	.50
Neodesha	chert	limestone	limestone	.80t	1.00t	.50
Newton	limestone	limestone	limestone	.75t	1.20t	.50
Olathe	limestone	limestone	limestone	1.50y	1.20t	.50
Ottawa	limestone	limestone	limestone	1.50y	1.10t	.50
Pittsburg	mine tailings	limestone	limestone	.75t	1.35t	.50
Rosedale	native limestone	limestone	limestone	.90t	1.60y	.45
Salina	limestone	limestone	limestone	1.75y	1.25y	.50
Topeka	limestone	limestone	limestone	1.75y	.75y	.50
Wellington	limestone	limestone	limestone	1.90y	1.40y	.50
Kentucky:						
Carlisle	limestone	limestone	limestone	.95y	.80y	.40
Lexington	local limestone	limestone	limestone	1.20y	1.10y	.40
Maysville	limestone	limestone	limestone	1.00y	1.25y	.60 to .70
Middlesboro	limestone	limestone	limestone	1.00y	1.35y	.40
Paducah	stone and gravel	limestone	limestone	.85t	1.00y	.40 to .50
Louisiana:						
Donaldsonville	gravel	limestone	limestone	1.25y	1.25y	.25
Kentwood	gravel	limestone	limestone	1.78y	1.74y	.40
Lake Charles	gravel	limestone	limestone	1.55y	1.10y	.40 to .50
New Orleans	gravel	limestone	limestone	1.68y	1.25y	.50
Shreveport	stone	limestone	limestone	1.68y	1.25y	.50
Maine:						
Bangor	local	limestone	limestone	2.50y	1.30y	.50
Biddeford	trap	limestone	limestone	1.30t	1.10t	5.00a
Lewiston	gravel	limestone	limestone	.50y	1.00y	.55
Waterville	gravel	limestone	limestone	.50y	1.15y	.55
Winslow	gravel	limestone	limestone	.50y	1.15y	4.10a

Locality	Material	Weight	Price	Notes
Maryland:				
Baltimore	gneiss, trap, limestone	2.50y	2.50y	
Easton	trap, granite, lime- stone	{ 1.30 1.60 2.00y	2.50y	
Westminster	limestone	1.00y	2.00y	
Massachusetts:				
Adams	gravel	1.00y	2.00y	
Amherst	trap	1.25 to 1.50t	1.35 to 1.50t	
Arlington	trap and granite	1.60t	1.60t	
Braintree	trap and granite	1.60t	1.60t	
Concord	local field	70tb	1.40t	
Fitchburg	trap	1.10t	1.10t	
Greenfield	trap	1.10t	1.10t	
Haverhill	trap	1.10t	1.10t	
Lawrence	gravel	1.21t	1.21t	
Leominster	field stone	1.21t	1.21t	
Lowell	trap	1.21t	1.21t	
Lynn	trap	1.21t	1.21t	
Manchester	granite	1.40t	1.40t	
Medford	trap	1.40t	1.40t	
Newton	stone	1.40 to 1.50	1.40 to 1.50	
North Adams	stone	1.40 to 1.50	1.40 to 1.50	
Norwood	stone	1.40 to 1.50	1.40 to 1.50	
Peabody	trap	.85t	.85t	
Quincy	trap	1.50t	1.50t	
Walpole	gravel	1.60t	1.60t	
Waltham	trap	1.60t	1.60t	
Watertown	trap	1.60t	1.60t	
Webster	trap	1.60t	1.60t	
Westfield	trap	1.60t	1.60t	
Worcester	trap	1.60t	1.60t	
Michigan:				
Adrian	gravel	1.00y	1.00y	
Alpena	gravel	1.25yc	1.25yc	
Ann Arbor	gravel	1.25y	1.25y	
Battle Creek	gravel	1.25y	1.25y	
Bay City	stone	1.35t	1.35t	
Belding	gravel	1.00y	1.00y	
Big Rapids	gravel	1.00y	1.00y	
Cadillac	gravel	1.45y	1.45y	
Detroit	granite, slag or lime- stone	.92y	.92y	
Flint	gravel	1.30y	1.30y	
Grand Rapids	gravel	1.00y	1.00y	
Holland	gravel	1.00y	1.00y	
Ionia	gravel	1.00y	1.00y	
Kalamazoo	gravel	.50y	.50y	
Marquette	gravel	1.25y	1.25y	
Monroe	gravel	1.25y	1.25y	
Muskegon	gravel	1.25y	1.25y	
Negaunee	gravel	1.25y	1.25y	
Niles	gravel	1.25y	1.25y	
Potoskey	gravel	1.25y	1.25y	
Port Huron	gravel	1.25y	1.25y	
Saginaw	gravel	1.25y	1.25y	
St. Johns	gravel	1.25y	1.25y	
St. Louis	gravel	1.25y	1.25y	
Sturgis	gravel	1.25y	1.25y	
Ypsilanti	gravel	1.25y	1.25y	
Minnesota:				
Duluth	trap	1.35y	1.35y	
Eveleth	pit gravel	1.65y	1.65y	
Fairmont	limestone	1.50y	1.50y	
Fairbault	gravel	2.06y	2.06y	
Hibbing	trap	.85y	.85y	
Mankato	limestone	.75y	.75y	
New Ulm	gravel	.75y	.75y	
Northfield	gravel	.75y	.75y	
Rochester	{ gravel limestone	{ 2.00y 1.75y	{ 2.00y 1.75y	
St. Cloud	granite	1.75 to 2.00y	1.75 to 2.00y	
St. Paul	limestone, trap and gravel	1.75 to 2.00y	1.75 to 2.00y	
Staples	limestone	1.50y	1.50y	
Stillwater	limestone	1.50y	1.50y	
Virginia	pit gravel	1.75y	1.75y	

For footnotes, see page 160.

New York	limestone and trap	1.25tc	lime-stone	1.60t	1.60t	66
Albany	limestone	.75t	lime-stone	1.10y	1.10y	88½
Buffalo	limestone	1.50y	lime-stone	1.00y	1.00y	75½
Bronxville	native	1.50y	lime-stone	1.50y	1.50y	62-75
Buffalo	gravel or limestone	.90	lime-stone	1.50y	1.50y	75
Deerp	broken stone	1.35y	slag	1.20y	1.20y	25
Dolgeville	gravel	1.25y	slag	1.80y	1.80y	50
Ellenville	local	1.00y	gravel	1.25y	1.25y	33 1-3
Elmira	gravel & pebbles	1.25y	gravel	.69y	.69y	56½
Geneva	No. 3	1.12t	No. 4	1.50y	1.50y	75
Gloversville	limestone	1.25t	No. 4	1.65y	1.65y	62
Herkimer	lime-stone	1.12y	trap	1.00y	1.00y	75
Hudson	trap	1.25t	trap	1.00y	1.00y	60
Lackawanna	No. 2	1.10y	trap	1.25y	1.25y	60
Lancaster	lime-stone	1.30y	lime-stone	1.75y	1.75y	62½
Little Falls	ayenite or limestone	1.25y	lime-stone	1.10y	1.10y	60
Lockport	sandstone & limestone	1.25 to 1.50y	lime-stone	1.75y	1.75y	62½
Mamaroneck	1½-in. stone	2.00y	lime-stone	2.00y	2.00y	62½
Massena	Gravel & stone	1.00y	lime-stone	1.50y	1.50y	58½
Middletown	lime-stone	1.75y	lime-stone	1.40y	1.40y	56½
New York City:						
Bronx	native	1.50y		1.59y	1.59y	80
Brooklyn	lime-stone, trap, granite	1.57y				75
Manhattan	gravel, trap or granite	1.45y		1.095y	1.095y	31½
Queens	trap	1.25y		.84y	.84y	31½
Richmond	trap	2.40y	trap	1.25y	1.25y	76
			screens	1.50y	1.50y	62½
Niagara Falls	lime-stone or gravel	1.12t	flint or trap screens	2.10y	2.10y	75
Ogdensburg	lime-stone	1.25y				50
Olean	lime-stone	1.47y		1.25y	1.25y	62½
Oneida	local	1.55yc	lime-stone	1.50y	1.50y	62½
Plattsburgh	lime-stone	1.29t	lime-stone	1.00y	1.00y	62½
Port Jervis	stone	1.75y	lime-stone	.90y	.90y	50
Salamanca	lime-stone	1.50y		1.75y	1.75y	55
Scotia	local gravel	1.50y		1.40y	1.40y	60.00a
Sidney	trap	.85 to 1.15y		.80y	.80y	40
Suffern	lime-stone	1.00y		1.00t	1.00t	66 2-3
Syracuse	native	2.00y	lime-stone	1.65y	1.65y	30
Tuckahoe	gravel	1.10yc	trap	1.00y	1.00y	75
Watertown	local gravel	1.40y	lime-stone	1.10yc	1.10yc	45.00a
Waverly	lime-stone	1.90y		1.50y	1.50y	50
North Carolina:						
Asheville	granite	2.00y	granite	2.00y	2.00y	40
Burlington	local trap	1.90y		1.00y	1.00y	35
Charlotte	granite	2.10y	granite	1.50y	1.50y	12½
Durham	trap	1.25t	trap	2.00t	2.00t	45
Gastonia	granite	2.00y	granite	1.00y	1.00y	15
Goldboro	stone	2.00y	granite	.75-1.00y	.75-1.00y	40
Greensboro	trap or granite	1.75y		1.25y	1.25y	15
Kinston	gravel	1.70t		.90y	.90y	38
Monroe	slate or granite	1.80y		60-1.15cy	60-1.15cy	45
Wilmington	granite	1.90t	granite	1.25t	1.25t	12½
North Dakota:						
Bismarck	granite	3.75y		Hauling	Hauling	15-1.75
Carlington	pit run gravel	1.50y		1.50y	1.50y	30
Fargo	gravel	1.50y		1.00y	1.00y	25
Grand Forks	gravel	1.50y		1.50y	1.50y	27½
Ohio:						
Ada	lime-stone	1.00y	lime-stone	1.00y	1.00y	20
Ashtabula	lime-stone	1.25t		1.85y	1.85y	27½-30
Bucyrus	gravel	.85t		1.25t	1.25t	25
Cambridge	gravel	.90y		1.25t	1.25t	25-30
Cedarville	gravel	1.20y		1.00y	1.00y	40
Cincinnati	stone, slag and gravel	.85y	lime-stone	1.75y	1.75y	28
Cleveland	crushed gravel	.70t	lime-stone	1.37y	1.37y	40
Columbus	gravel or limestone	.90t	lime-stone	.75t	.75t	25
Delaware	gravel	.93-1.13t	lime-stone	1.40t	1.40t	25
East Liverpool	gravel	.90t		.07y	.07y	25
East Palestine	gravel	.90t		1.13t	1.13t	30
Eaton	lime-stone	.80tc	lime-stone	.83t	.83t	40
Findlay	lime-stone	.92t	lime-stone	1.30y	1.30y	25
Fostoria	gravel	.60y	lime-stone	1.27t	1.27t	25
Franklin	lime-stone	.92t	lime-stone	.60y	.60y	25
Gallon	lime-stone	.15t	lime-stone	1.00t	1.00t	30
Granville	gravel	.75y		2.00y	2.00y	22½
Hamilton	gravel	.90t		1.00y	1.00y	31½
Kent	gravel	.90t		1.00t	1.00t	30

For footnotes, see page 160.

TABLE 3 A.—LOCAL DATA.—Continued.

	For concrete	Cost	For bottom course macadam	For top course macadam	Cost	Cost of sand	Cost unskilled labor per hour	Cost of 2-horse team and driver per hour
Ohio (Continued):								
Lakewood	limestone, slag, gravel	\$.90 to 1.15t				1.50t	\$.35-.50	\$.80-.80
Lancaster	limestone	.85yb				1.00y	.20-.25	.50
Lima	gravel	.20t				1.50t	.27	.50
Logan	gravel	.77t				.67t	.45	.45
Lorain	slag	.85t					.20	.40
Marion	gravel	1.55y				1.55y	.30-.40	.60-.75
Marion	limestone	.76t				1.55y	.25	.40
Massillon	slag or gravel	1.00 to 1.50y				1.50y	.25	4.50a
Milford	gravel	.92t				1.20y	1.15-2.00a	.80
Mt. Gilead	limestone	.50y				1.20y	.25	.50
Newark	limestone, gravel & slag	1.35y				1.5y	.25	.50
New Boston	gravel & stone	.65-1.25y				1.35y	.22½	.45
Orville	gravel	.66t				1.00y	.25	.50
Port Clinton	gravel	.50t				1.25y	.25	4.50a
Springfield	limestone	.94t				1.78t	.25	.55
Staubenville	gravel	1.00y				1.80t	.30	.70
Toronto	gravel	1.00y				1.50t	.30	.60
Troy	grav., limestone or slag	1.00y				1.50y	.25	.65-2-3
Urbana	stone & gravel	1.00y				.78y	.22½	.50
Youngstown	gravel	1.00y				1.0y	.30	.60
Zanesville	gravel	.92y				1.25y	.25	.60
Oklahoma:								
Bartlesville	limestone	1.10t				1.70y	.25-30	.50-.65
Chickasha	limestone	1.75y				1.5y	.25	.50
Elk City	limestone	1.90y				1.35y	.25	.40
Enid City	limestone	2.00y				1.50y	.25	.40
Frederick	granite	2.00y				1.50y	.25	.50
McAllister	limestone	1.70y				1.5y	.25	.50
Norman	limestone	1.75y				1.35y	.25	.40
Sapulpa	limestone	2.05y				1.35y	.25	.40
Shawnee	limestone	1.65y				1.35y	.25	.50
Oregon:								
Baker	river rock	1.25y	No. 2	No. 1	1.25y	1.00y	.30	.63-1-3
Eugene	gravel	1.50y	basalt	basalt	1.75y	2.00y	.25	.45
McMinnville	stone	.93y	stone	stone	1.93y	1.5y	.31½	.50-.60
Portland	gravel	1.25y	gravel	stone	1.15y	1.25y	.25	.82½
Roseburg	gravel	1.40y	stone	stone	1.35y	1.40y	.25	.60
West Linn	gravel	1.00t			1.00y			
Pennsylvania:								
Allentown	limestone	1.00t				1.50t	.30	.60
Beaver Falls	gravel	.80t				.90t	.25	.60-.65
Bethlehem	limestone	1.00t				1.28t	.27½	.70
Bloomsburg	gravel	1.65t				1.28t	.27½	.45
Bradford	gravel & limestone	1.75-2.25y				1.50t	.38	.70
Bull	gravel	.98t				1.78y	.38	.70
Carlisle	limestone	1.30t	field or local	quartzite	1.28t	1.1t	.25	.63½
Chambersburg	limestone	.75t	limestone	limestone	1.00-1.25	1.50th	.17-17½	.40
Clearfield	limestone & sandstone	1.21y	limestone	limestone	1.21y	1.50t	.17½	.40
Connellsville	gravel	1.25t				1.50t	.25	.60
Duquesne	gravel	1.30t				1.50t	.25	.60
Ellwood City	trap	1.10t				1.25t	.27½	.65
Erle	local gravel	1.51t				1.50y	.30	6.00a
Farrell	crushed stone	1.25 to 1.50y				.70	.32	.75
Franklin	paving base, furnace	1.45t				1.50y	2.50day	6.00a.65
Freeland	crushed stone	1.45t				1.50t	20-22-25	.60½
Greensburg	slag	1.15t				1.70t	27.7	.66½
Hanover	limestone	1.10t				1.60t	.17½	.40
Hazleton	sandstone	1.15t				1.40t	.22-25	.50
Holidaybury	limestone & trap	1.10t				.75t	.25	.50-.60
Jeannette	limestone	1.10t				1.70t	2.50 per 9 hrs.	6.00a
Johnstown	B. F. slag	.45y	limestone for con. privs.		1.35y	{ 1.30 river 1.80 white s'd 1.10 steel rdy }	2.25a	.60
Junata	limestone	1.00t				1.65	.27	.50
Kingston	gravel & crushed	1.00t				.85t	.22-25	.55
Lansford	trap	1.60t				1.10t	.20	.50
Leaksville	bluestone	1.25t				1.25t	.25	.55

Lewisburg	trap rock	1.25y	.....	.....	.....	1.25y	.....	.....	4.50a
McKeesport	crushed slag	45c	.....	.....	.....	.....	.....	.....	.65
Meadville	local gravel	77t	.....	.....	.....	.....	.....	.....	.50
Mechanicsburg	limestone	1.37t	.....	.....	.....	.....	.....	.....	.50
New Castle	gravel	.92t	.....	.....	.....	.....	.....	.....	6.00a
Norristown	limestone	68 + 50	.....	.....	.....	.....	.....	.....	.60
North East	lake gravel	1.25y	.....	.....	.....	.....	.....	.....	.50
Northumberland	limestone	1.35t	.....	.....	.....	.....	.....	.....	.50
Oil City	crushed slag	1.15t	.....	.....	.....	.....	.....	.....	.61
Perkasie Boro.	bluestone	.82t	.....	.....	.....	.....	.....	.....	4.50a
Pottsville	3/4 to 1" trap rock	1.25t	.....	.....	.....	.....	.....	.....	.55
Punxsutawney	native sandstone	1.50 to 1.65t	.....	.....	.....	.....	.....	.....	.50
Rantlin	river gravel	1.90t	.....	.....	.....	.....	.....	.....	.65
Rogersford	limestone & trap	1.30t	.....	.....	.....	.....	.....	.....	.56%
Scranton	hard sandstone	1.65t on street	.....	.....	.....	.....	.....	.....	.70
Sewickley Borough	Ohio river gravel	1.60t	.....	.....	.....	.....	.....	.....	.50
Somerset Borough	crushed native stone	1.10t	.....	.....	.....	.....	.....	.....	.60
South Fork	limestone	1.13t	.....	.....	.....	.....	.....	.....	.80
Steeton	limestone	1.25t	.....	.....	.....	.....	.....	.....	.45
Tyone	limestone	1.00y	.....	.....	.....	.....	.....	.....	.70
Uniontown	gravel & slag	1.10t	.....	.....	.....	.....	.....	.....	.25
Washington	gravel	.75t	.....	.....	.....	.....	.....	.....	.50
Waynesboro	limestone	1.75t	.....	.....	.....	.....	.....	.....	.50
West Hazleton	No. 2 broken stone	1.20t	.....	.....	.....	.....	.....	.....	.50
West Homestead	Gravel	1.25y	.....	.....	.....	.....	.....	.....	.50
Williamsport	washed gravel	1.25y	.....	.....	.....	.....	.....	.....	.50
York	local limestone	1.10t	.....	.....	.....	.....	.....	.....	.50
Rhode Island:									
Providence	granite, gravel	1.60y	.....	.....	.....	.....	.....	.....	.60
Westerly	crushed granite	.80t	.....	.....	.....	.....	.....	.....	.70
Woonsocket	trap	1.75t	.....	.....	.....	.....	.....	.....	6.00a
South Carolina:									
Bennettsville	gravel	1.65t	.....	.....	.....	.....	.....	.....	.35
Charleston	granite	.....	.....	.....	.....	.....	.....	.....	.35
Clinton	1 1/2" granite	.....	.....	.....	.....	.....	.....	.....	.40
Florence	1 1/2" granite	.....	.....	.....	.....	.....	.....	.....	.40
Greenville	crushed granite	1.40t	.....	.....	.....	.....	.....	.....	.....
South Dakota:									
Aberdeen	sand & gravel	1.50y	.....	.....	.....	.....	.....	.....	.50
Deadwood	porphyry	1.50y	.....	.....	.....	.....	.....	.....	3.00a
Huron	gravel	1.60y	.....	.....	.....	.....	.....	.....	.60
Lead	crushed porphyry	1.23y	.....	.....	.....	.....	.....	.....	.62%
Madison	gravel	.75y	.....	.....	.....	.....	.....	.....	.50
Mitchell	local washed gravel	1.25y	.....	.....	.....	.....	.....	.....	.45-50
Sioux Falls	quartzite	1.35	.....	.....	.....	.....	.....	.....	.25
Watertown	gravel	1.25y	.....	.....	.....	.....	.....	.....	.45
Yankton	cement	1.32bbt	.....	.....	.....	.....	.....	.....	.50
	sand	2.25y	.....	.....	.....	.....	.....	.....	.27%
	stone	1.12y	.....	.....	.....	.....	.....	.....	.....
Tennessee									
Clarksville	limestone	1.18y	.....	.....	.....	.....	.....	.....	.35
Dyersburg	limestone	1.75 to 1.80y	.....	.....	.....	.....	.....	.....	3.50a
Jackson	limestone	.....	.....	.....	.....	.....	.....	.....	.35
Memphis	limestone	1.17y	.....	.....	.....	.....	.....	.....	.50
Morristown	limestone	1.50y	.....	.....	.....	.....	.....	.....	.35
Texas:									
Beville	gravel	1.50y	.....	.....	.....	.....	.....	.....	.50
Brenham	gravel	.90y	.....	.....	.....	.....	.....	.....	.....
Brownwood	limestone	1.25y	.....	.....	.....	.....	.....	.....	.40
Cleburne	gravel or limestone	1.32y	.....	.....	.....	.....	.....	.....	.32 1/2
Corpusana	pit gravel	1.25y	.....	.....	.....	.....	.....	.....	.40
Corpus Christi	limestone	2.13t	.....	.....	.....	.....	.....	.....	.50
Greenville	gravel	1.50y	.....	.....	.....	.....	.....	.....	.50
Houston	limestone	.....	.....	.....	.....	.....	.....	.....	.55 1/2
Houston Heights	limestone	2.25y	.....	.....	.....	.....	.....	.....	.60
Pittsburgh	gravel	1.75y	.....	.....	.....	.....	.....	.....	.40
Port Arthur	stone & gravel	3.50y	.....	.....	.....	.....	.....	.....	6.00a
San Angelo	gravel	1.50y	.....	.....	.....	.....	.....	.....	.50
Sulphur Springs	limestone	1.72t	.....	.....	.....	.....	.....	.....	.50
Texarkana	gravel	1.25y	.....	.....	.....	.....	.....	.....	.45
Utah:									
Logan	limestone	1.00y	.....	.....	.....	.....	.....	.....	.50
Ogden	.....	.....	.....	.....	.....	.....	.....	.....	.60
Salt Lake City	gravel, limest., quartzite	1.10yc	.....	.....	.....	.....	.....	.....	.67
Vermont:									
Montpelier	granite	.90t	.....	.....	.....	.....	.....	.....	.50
Newport	gravel & limestone	.....	.....	.....	.....	.....	.....	.....	.40-50

For footnotes, see page 100.

TABLE 3A—LOCAL DATA.—Continued.

	For concrete	Cost	For bottom	Cost	For top course	Cost	Cost of sand	Cost of unskilled labor per hour	Cost of 2-horse team and driver per hour
	Type of stone		Type of stone		Type of stone				
Virginia:									
Danville	gneiss	1.30y	gneiss	1.30y	gneiss	1.30y	.75	.13½	.35
Fredericksburg	limestone	1.50y	limestone	1.50y	limestone	1.50y	1.50a	1.50a	.444
Harrisonburg	granite	1.20t	trap	1.26h	trap	1.26h	1.00y	.17½	.35
Newport News	limestone	.80y	limestone	.80y	limestone	.80y	1.50y	.15	.40
Stanton:									
Bellingham	gravel	1.50 to 1.75y	gravel	1.50y	gravel	1.50y	1.50-1.75y	.30	.75
Bremerton	gravel	.60y	gravel	.60y	gravel	.60y	1.05y	.35	.75
Everett	trap	1.40y	trap	1.35y	trap	1.35y	1.40y	.33	.75
Ilwaco	gravel	1.10y	gravel	1.10y	gravel	1.10y	1.10y	.37½	.75
Mt. Vernon	gravel	1.25y	gravel	1.25y	gravel	1.25y	1.25y	.30	.58½
Nc. Yakima	gravel	1.00y	gravel	1.00y	gravel	1.00y	1.00y	.31¼	.62½
Olympia	gravel	1.25y	gravel	1.25y	gravel	1.25y	1.25y	.31¼	.61½
Port Angeles	gravel	.75y	gravel	.75y	gravel	.75y	.80y	.31	.50
Puyallup	basalt	1.00y	basalt	1.00y	basalt	1.00y	.28y	.30-37½	2.62½
Pullman	basalt	1.25-1.65y	basalt	1.35y	basalt	1.35y	1.60-1.75y	.31¼	.75
Raymond	gravel	1.25y	basalt	1.00y	basalt	1.15y	1.00y	.31½	.75
Spokane	gravel	1.75yc	basalt	2.00y	basalt	2.00y	1.80y	.32½	.62½
Walla Walla	gravel & granite	1.75-2.00y	granite	2.00y	granite	2.00y	1.25y	.35	.75
West Virginia:									
Huntingdon	gravel	.30t	gravel	.55t	gravel	.55t	1.20y	.22	.20
Martinsburg	gravel & slag	.60t	gravel	.55t	gravel	.55t	1.25t	.20	.45
Moundsville	gravel	.60y	gravel	.55t	gravel	.55t	.75y	.20-25	.45
Parkersburg	gravel	.60y	gravel	.55t	gravel	.55t	1.20y	.22	.20
Wisconsin:									
Appleton	limestone	1.65y	limestone	1.65y	limestone	1.65y	1.40y	.22½	.55
Beloit	gravel	1.00y	limestone	1.05y	limestone	1.05y	1.25y	.25	.50
Burlington	gravel	1.10y	limestone	1.05y	limestone	1.05y	1.25y	.22½	.56
Columbus	gravel	1.30y	limestone	1.05y	limestone	1.05y	1.45y	.22½	.45
De Pere	limestone	1.45yc	limestone	1.05y	limestone	1.05y	1.45y	.22½	.45
Eau Claire	trap	1.82y	trap	1.82y	trap	1.82y	.50y	.22½	.45
Fond du Lac	gravel or limestone	1.85y	local limestone	.90y	granite	3.00y	.70y	.25	.50
Janesville	gravel	.90y	limestone	1.50y	limestone	1.50y	1.10y	.25	.50
Jefferson	limestone	1.50y	limestone	1.50y	limestone	1.50y	1.10y	.25	.50
Lake Geneva	crushed stone & gravel	1.35-1.85y	limestone	1.50y	limestone	1.50y	1.10y	.25	.50
Madison	gravel & granite	1.35-1.85y	limestone	1.50y	limestone	1.50y	1.10y	.25	.50
Menasha	limestone	1.35y	limestone	1.35y	limestone	1.35y	1.35y	.25	.50
Milwaukee	limestone	1.40y	limestone	1.40y	limestone	1.40y	1.35y	.25	.50
Nenah	limestone	1.25y	limestone	1.25y	limestone	1.25y	1.35y	.25	.50
New London	limestone	1.50y	granite	2.20y	limestone	1.35y	1.35y	.25	.50
Oshkosh	stone & gravel	1.35y	limestone	1.35y	limestone	1.35y	1.35y	.25	.50
Portage	granite & gravel	1.50y	limestone	1.40	limestone	1.35y	1.35y	.25	.50
Rice Lake	limestone	1.35y	limestone	1.35y	limestone	1.35y	1.35y	.25	.50
Sheboygan	limestone & granite	2.00-2.40y	trap	1.35y	granite	2.40y	1.35y	.25	.50
Stevens Point	trap	1.65y	trap	1.35y	granite	2.40y	1.35y	.25	.50
Superior	trap	1.65y	trap	1.35y	granite	2.40y	1.35y	.25	.50
Two Rivers	trap	1.25y	trap	1.25y	limestone	1.05y	1.25y	.25	.50
Wausau	gravel	1.25y	trap	1.25y	trap	1.25y	1.25y	.25	.50
Wyoming:									
West Allis	gravel & limestone	1.05y	trap	1.25y	trap	1.25y	1.65y	.35	.65
Canada:									
Casper	gravel	1.05y	gravel	1.05y	gravel	1.05y	1.00y	.39	.72
Cheyenne	gravel	1.05y	gravel	1.05y	gravel	1.05y	1.00y	.39	.72
Rock Springs	gravel	1.05y	gravel	1.05y	gravel	1.05y	1.00y	.39	.72
Canada:									
Brantford, Ont.	crushed	.25y	crushed	1.35y	2-inch	1.35y	1.00y	.25	.60
Calgary, Alta.	boulders	1.75yc	boulders	2.00t	boulders	2.00t	1.85y	.30	.60
Charlestown, P. E. I.	gravel	.75y	limestone	1.10y	limestone	1.10y	1.00y	.17½	.40
Galt, Ont.	gravel	1.00y	stone	1.25y	stone	1.25y	.75y	.27½	.60
Kitchener	gravel	2.40 to 4.50 per cord of 128 cu. ft.	limestone	1.35y	limestone	1.35y	.80y	.25	.50
London	gravel	2.40 to 4.50 per cord of 128 cu. ft.	limestone	1.35y	limestone	1.35y	.90y	.25-30	.60
Ottawa	limestone	1.17t	limestone	.75t	limestone	1.50t	1.00y	.28	.64
Regina	gravel	2.25y	trap or limestone	1.00t	trap	1.00-1.48t	2.25y	.25	.60
St. John	trap or limestone	1.48t	trap or limestone	1.00t	trap	1.00-1.48t	1.40y	.22-25	5.00a
Sherbrooke	limestone	1.75y	granite	2.20y	granite	2.20y	1.50y	.25	.60
Sydney	gravel	.90t	granite	2.20y	granite	2.20y	1.25t	.20	.60
Toronto	trap & limestone	1.28-2.50t	granite	1.35t	granite	1.35t	1.50t	.30	.66½
Victoria	gravel	1.75y	granite	1.75y	trap	2.00y	1.60y	.34	.75
Winnipeg, Man.	limestone	2.06yc	limestone	2.06yc	limestone	2.06yc	1.76yc	.25	.60

t—per ton; y—per cubic yard; a—per day; b—at quarry or crusher; c—on street or delivered; d—for sidewalks only; f—per 100 cubic feet; g—bushel; h—long ton; i—Italian labor; j—per perch; l—per load; n—native labor.

(Continued from page 151.)

In Gastonia, N. Car., grading cost 30c. a square yard, not included in the cost of paving given.

In Ada, O., excavation cost 25c. for the macadam pavement, and 30c. for the brick, neither included in the prices given. Stone curb laid in connection with the paving cost 42c.

In Barberton, O., grading cost 30c. a cubic yard, not included in the cost of paving given.

In Bethlehem, Pa., grading exceeding in depth the thickness of the pavement cost 80c. a cubic yard.

In Greensburg, Pa., grading cost 58½c. a cubic yard, and sandstone curb 73c. a lineal foot, neither of which was included in the price of paving given.

In Johnstown, Pa., grading for brick pavement cost 13c. a square yard and for concrete pavement 15c. a square yard, both of which are included in the costs of paving given.

In Larksville, Pa., excavation up to a total depth of 1 foot is included in the contract cost, the contractor receiving additional payment for cuts greater than this.

In Wilkes-Barre, Pa., excavation cost 50c. a cubic yard.

In Yankton, S. Dak., grading cost 35c. a cubic yard, which was not included in the cost of paving given.

In Dyersburg, Tenn., excavation in excess of the thickness of the pavement cost 30c. to 40c. a cubic yard.

In Port Angeles, Wash., grading cost 60c. a cubic yard.

In Pullman, Wash., earth excavation cost 50c. and rock excavation \$2.75. Concrete curb and gutter cost 50c. a lineal foot. None of these was included in the costs of paving given.

In Menasha, Wis., the costs given did not include grading, which cost 45c. a yard extra.

In Neenah, Wis., grading cost 45c. a cubic yard extra, which was not included in the cost of paving given.

In Casper, Wyoming, grading cost 95c. a cubic yard.

In Edmonton, Alberta, grading costs about 25c. a square yard, which was not included in the cost of paving given.

Base. In Denver, Colo., base for sheet asphalt pavement cost 60c. a square yard, which was not included in the cost of paving given.

In New Haven, Conn., sheet asphalt laid on old macadam costs \$1.00 a square yard, but where a 6-inch concrete base is constructed, the cost is \$1.84. Creosoted wood blocks laid on old concrete costs \$2.25, whereas when a new 6-inch base is constructed, the cost is \$3.14.

Prices given by Lake Forest, Ill., for bituminous concrete and bituminous macadam do not include base. The former was laid on a 5-inch concrete base costing 60c., and the bituminous macadam on an old macadam which cost 18c. a yard to shape up for the purpose.

In Oak Park, Ill., asphaltic concrete cost \$1.47, including 6-inch concrete base; \$1.05 on old macadam pavement, including the preparing of the surface of the old macadam and adding two inches of new macadam, and \$1.58 including a 4-inch concrete base and preparation of a surface of old macadam on which this base was placed.

In North Vernon, Ind., concrete base cost 45c. a square yard.

At Atchison, Kan., the base used under brick pavement cost 45c. a square yard.

In Lexington, Ky., the base for sheet asphalt pavement, not included in price, cost 85c. a square yard.

In Maysville, Ky., 6-inch concrete base under sheet asphalt pavement cost 85c. a square yard, and the base under brick pavement cost 82c., neither being included in price of pavement given.

In Boston, Mass., the cost of granite and creosoted wood block pavement given does not include the base, which cost 85c. a square yard in each case.

In Flint, Mich., the cost of the base, which was not included in the pavement costs given, was 65c. a square yard, the work being done by the municipality.

In Grand Rapids, Mich., the cost of the base for sheet asphalt pavement, which was not included in the cost of the pavement, was 65c. a square yard.

In Ionia, Mich., neither grading nor base was included in the cost of brick pavement given, the grading costing 25c. a square yard and the base 61c.

In Odessa, Mich., grading for brick pavement cost 16½c. a square yard and the base 60c., neither being included in the cost of pavement given.

In Ypsilanti, Mich., 5-inch concrete base for bituminous concrete pavement cost 50c. a yard, which was not included in the cost given.

In Duluth, Minn., sandstone block, including base, cost \$2.85, and \$2.25 not including base.

In Rochester, Minn., 5-inch concrete base cost 70c. a square yard, which was included in the cost of paving given.

In Madison, N. J., excavation, not included in the costs of pavement given, averaged 56c. a cubic yard. The 4-inch concrete base under the asphalt block pavement, not included in the cost given, was 56c. a square yard.

In Auburn, N. Y., 5-inch concrete base under bithulithic pavement cost 54c. a square yard.

In Little Falls, N. Y., neither base nor grading are included in the costs of paving given. The grading cost about 25c. a square yard and the concrete base for the granite, brick and bithulithic cost 75c. a square yard, and the 3-inch stone base for the bituminous macadam, 40c. a square yard.

Bronx Borough, New York City, paid 85c. a square yard for concrete base for sheet asphalt and granite block pavement, which was not included in the costs of paving given. The base for bituminous concrete pavement cost 57c. a square yard, which also was not included in the cost given.

In Brooklyn, N. Y., the costs given of sheet asphalt and stone block did not include the concrete base, which cost \$5.80 a cubic yard for the sheet asphalt and \$4.60 a cubic yard for the stone block. The asphalt block was laid on an old base, and the second-hand granite blocks on sand.

In the Borough of Queens, the costs of paving given did not include base or excavation. The base for the sheet asphalt cost \$5.50 a cubic yard.

In the Borough of Richmond, the costs of paving given did not include base, that for the granite pavement costing \$1.01 a square yard, that for the bituminous concrete costing \$1.07 to \$1.12. The brick was laid on an old concrete base. Part of the bituminous macadam was laid on old macadam as a foundation, and the cost of preparing this, consisting of furnishing and spreading broken stone, was 37c. a square yard.

In Niagara Falls, N. Y., bituminous concrete cost \$1.25 a square yard by municipal force, without base, the base costing \$5.70 a cubic yard, or 95c. a square yard.

In Greensboro, N. Car., the cost given of sheet asphalt and bitulithic did not include base, which cost 60c. a square yard. In the case of bitulithic on old macadam, it cost 4c. a square yard to prepare the old macadam.

In Cambridge, O., the 4-inch 1:2:4 concrete base cost 74c. a square yard, not included in the cost of paving given.

In Cincinnati, O., the cost of paving given included excavation for the depth of the pavement and base, but not the cost of the base. The base used varied from 3 inches to 8 inches and the cost of same from 42c. to \$1.00 a square yard.

In Cleveland, O., the costs of paving given did not include base, 6-inch concrete base costing 90c. a square yard.

In Logan, O., the cost of gravel base for brick pavement was 20c. a square yard, which was included in the cost of paving, the total cost, including base, being 95c.

In Orrville, O., cost of pavement given did not include base, which cost 70c. a square yard.

In Kingston, Pa., the base of brick pavement cost 75c. a square yard. In addition, about 1,000 square yards were laid on a mortar bed one inch thick, composed of 1 cement to 4 sand, and this cost 6c. a square yard more than a 2-inch sand cushion. Grading cost 15c. a square yard. Both of these were included in the cost of paving given.

In Northampton, Pa., base cost 84c. a square yard, which was not included in the cost of paving given.

In Charleston, S. Car., a 4-inch base for sheet asphalt pavement cost 60c. a square yard, binder 20c. and top 63c.

In Fort Worth, Tex., base for wood block pavement cost 53c. a square yard, which was not included in the cost of paving given.

In Houston, Tex., the costs of paving given did not include base, the cost of which was \$1.00 a square yard for sheet asphalt, 95c. for brick and 93c. for bituminous concrete. Excavation was not included except in gravel, where $\frac{1}{4}$ of a yard to the square yard was included in the price. The bituminous macadam was laid on an old gravel pavement which had previously been constructed at a cost of 75c. a square yard.

In Salt Lake City, Utah, base for sheet asphalt cost 76c. a square yard, for bitulithic 41c., for bituminous concrete 75c., and for rock asphalt 76c. None of these was included in the costs of paving given.

In Victoria, B. C., the base for sheet asphalt cost 82c. a square yard, which was not included in the cost of paving given.

In Toronto, Ont., the prices of the paving given did not include the cost of base, which was \$5.90 a cubic yard, except in the case of creosoted wood block, where it was \$5.85, these being contract prices.

MISCELLANEOUS PAVEMENTS.

A considerable number of cities reported having constructed during 1916 pavements of various kinds which are not classified in the tables because of the comparatively small number of each kind. These we are giving in the following running statement, arranging them alphabetically according to states and cities, as in the case of the tables:

ARIZONA: Globe—1,950 sq. yds. of slag and decomposed granite at \$0.35, municipal work.

CALIFORNIA: Fresno—15,970 sq. yds. of Warrenite. Los Angeles—8,888 sq. yds. of Warrenite at \$1.35 per square yard, including base. Ontario—oil and gravel surface, 46,000 sq. yds. at 24.3c, including base, by contract. San Luis Obispo—7,000 sq. yds. gravel, treated with oil and covered with screenings, municipal work, costing \$0.25 a square yard. Venice—3,367 sq. yds. of Warrenite. Woodland—49,373 sq. yds. of Warrenite.

COLORADO: Colorado Springs—oiled 60,000 sq. yds. of roadway, after preparing same, at a cost of \$0.08 per square yard, municipal work.

CONNECTICUT: Danbury—2,000 sq. yds. of 2-inch Amiesite at \$1.75, including 5-inch concrete base and grading. New Canaan—two miles of Warrenite by contract at \$2.24 a square yard, including base. Stamford—4,624 sq. yds. of Warrenite. Winchester—11,743 sq. yds. Warrenite.

FLORIDA: Tampa—68,000 sq. yds. of asphalt block by contract at \$1.65, on a sand foundation, no grading included.

GEORGIA: Savannah—12,981 sq. yds. of asphalt block laid by municipal forces for \$1.98 a square yard, not including base.

ILLINOIS: Cairo—8,000 sq. yds. "novaculite," including base, by contract at \$0.35 a square yard.

INDIANA: Anderson—.09 mile of "rocmac" at \$1.15 a square yard. Decatur—1,067 sq. yds. of crushed stone with a Tarvia filling at \$1.92 a square yard, not including the base. South Bend—3,580 sq. yds. of "glutrin" macadam, by contract at \$0.99.

IOWA: Creston—Hassam pavement, 5 inches thick, 17,850 sq. yds. by contract, without base, at \$1.60.

KANSAS: Pittsburg—34,826 sq. yds. of bituminized earth by contract at \$1.35, including base but no excavation. Rosedale—2,870 sq. yds. of Hassam, by contract at \$1.65.

MASSACHUSETTS: Amesbury—9,620 sq. yds. Warrenite. Boston—5,120 sq. yds. of Hassam block, including base, at \$3.10. Holyoke—6,603 sq. yds. of asphalt block laid by the municipality at a cost of \$2.41, including base and grading. West Springfield—6,660 sq. yds. Warrenite.

MICHIGAN: Detroit—83,716 sq. yds. of cedar block on a concrete base laid by contract at \$2.64, including excavation and base. Flint—1,450 sq. yds. asphalt block laid by the municipality. Petoskey—15,000 sq. yds. of old macadam treated with Tarvia B.

MISSOURI: Independence—12,500 sq. yds. of National pavement laid by contract at \$1.35, including grading and base.

NEW HAMPSHIRE: Manchester—16,977 sq. yds. Warrenite.

NEW JERSEY: Belleville, 43,774 sq. yds. Warrenite. Cape May City—2,200 sq. yds. Warrenite by the municipality at \$1.25, including base and excavation. East Orange—16,401 sq. yds. asphalt block at \$2.20, including base. Harrison—2,201 sq. yds. asphalt block. Jersey City—5,494 sq. yds. asphalt block. Kearney—4,081 sq. yds. Warrenite. Madison—2,962 sq. yds. asphalt block at \$1.55, not including base. Newark—13,937 sq. yds. 2-inch and 3-inch asphalt block laid by the municipality at \$2.27 including base; also 7,609 sq. yds. of 10-inch telford with Tarvia surface at \$1.07, laid by municipality. New Brunswick—78,928 sq. yds. Warrenite, and 2,193 sq. yds. of asphalt block. Perth Amboy—37,613 sq. yds. of asphalt block. Plainfield—15,000 sq. yds. of water-bound macadam with Tarvia B finish, by contract at \$0.82. Princeton—14,159 sq. yds. of asphalt block. South Orange—14,867 sq. yds. asphalt block. Summit—4,340 sq. yds. of Amiesite at \$1.70 by contract, including 6-inch broken stone base; also 149,000 sq. yds. of Tarvia B surface treatment at 6.23 cts. Weehawken—6,463 sq. yds. asphalt block. West New York—23,305 sq. yds. of asphalt block at \$2.45 by contract, including base. Woodbridge—6,000 sq. yds. asphalt block.

NEW YORK: Albany—the granite blocks given in the table consisted of several classifications, as follows: dressed granite with 1:1 cement grout filler, \$3.21 per square yard; redressed granite block 5 inches thick with 1:1 cement grout filler, \$2.05; dressed and redressed granite in car tracks, 5 inches thick, 1:1 grout filler, \$2.81; second-hand granite blocks, 10 inches thick on sand, with sand filler, \$1.40; second-hand granite block on concrete with 1:1 grout filler, \$1.66; all work by contract and all including base. Bronxville—7,000 sq. yds. of 3-inch cinders laid by municipality at \$0.095; also 1,200 sq. yds. of asphalt block laid by municipality at \$2.25, including 6-inch concrete base. Dobbs Ferry—40,343 sq. yds. asphalt block. Glencove—6,745 sq. yds. asphalt block. Hicksville—7,147 sq. yds. asphalt block. Hudson Falls—1,382 sq. yds. asphalt block. Inwood—19,592 sq. yds. asphalt block. Lockport—4,700 sq. yds. asphalt block by contract at \$2.50, including base and grading. Mt. Vernon—9,723 sq. yds. of asphalt block. New York City, Brooklyn Borough—4,745 sq. yds. asphalt block laid by contract on old base at \$1.64; also 29,525 sq. yds. of second-hand granite block laid on sand at \$1.05. Borough of Richmond—old crushed asphalt block

4 inches deep, two miles at \$0.32 a sq. yd., not including base or excavation; also surfacing with old macadam from other streets, 2.6 miles at 4c. a sq. yd. Newburgh—6,009 sq. yds. asphalt block. Niagara Falls—3,550 sq. yds. asphalt block by contract at \$3.00, including base but not excavation. Pocantico Hills—1,285 sq. yds. asphalt block. Rochester—9,200 sq. yds. asphalt block. Salamanca—11,200 sq. yds. of Amiesite, by contract at \$1.76, including base and grading. Schenectady—1,245 sq. yds. asphalt block. Suffern—1 mile of asphalt block. White Plains—23,500 sq. yds. of asphalt block.

NORTH CAROLINA: Asheville—976 sq. yds. of "durax" at \$2.70, including base. Burlington—3,000 lineal feet of concrete along street car tracks, 7 feet wide and averaging 9½ inches thick, total cost about \$9,000. Goldsboro—10 miles of sand-clay laid by municipality at \$300 per mile. Raleigh—1,875 sq. yds. of Warrenite.

OHIO: Cincinnati—763 sq. yds. of limestone block with grout filler, by contract at \$2.80, including base and excavation from grade to sub-grade; also 27,005 sq. yds. re-cut granite blocks with pitch filler at \$1.52, not including base. Defiance—16,201 sq. yds. of asphalt block. Elyria—2,100 sq. yds. asphalt block. Leipsic—2,751 sq. yds. of asphalt block. Napoleon—2,627 sq. yds. asphalt block. Shaker Heights—84,157 sq. yds. asphalt block. Toledo—11,800 sq. yds. asphalt block. Urbana—5,300 sq. yds. asphalt block, by contract at \$2.20, including base and grading.

OKLAHOMA: McAlistier—burned shale, one mile.

OREGON: Portland—10,361 sq. yds. bitulithic re-dressing, 2 inches thick with 1½-inch binder, \$1.04; the same without binder on old concrete base, \$1.10; also gravel bitulithic 2 inches thick on a 3-inch base, \$1.30.

PENNSYLVANIA: Allentown—removing old brick and adding 2 inches to the 5-inch concrete base and laying sheet asphalt thereon, 2-inch wearing surface and 1-inch binder, 1,562 sq. yds. by contract at \$1.57; also 4,100 sq. yds. of Amiesite laid on old telford at \$1.30. Bethlehem—30,538 sq. yds. of 3 inches of Amiesite on 5-inch concrete base at \$1.75, and 7,201 sq. yds. on a 4-inch concrete base at \$1.58, both including base and grading by contract. Hazleton—15,070 sq. yds. of Hassam bicomac by contract at \$1.75, including base; also 5,269 sq. yds. of Amiesite at \$1.01 a square yard on old macadam base. Kingston—6,500 sq. yds. of asphalt block at \$2.42, including base and grading. McKeesport—1,880 sq. yds. of relaying old granite block from other streets at \$1.25, including base. Nanticoke—7,077 sq. yds. of asphalt block. Pittston—3,271 sq. yds. asphalt block. Royersford—cinder and slag laid by municipality at 10c. a square yard. Scranton—6,960 sq. yds. of National pavement laid by contract at \$1.49 2/3, not including base. Steelton—6,170 sq. yds. of Amiesite by contract at \$1.98, including base and grading; also 29,710 sq. yds. of Warrenite by contract at \$2.10, including base. Wyoming—6,816 sq. yds. of asphalt block.

SOUTH CAROLINA: Greenville—12,000 sq. yds. of Tarvia surface by contract at \$1.18, including grading and base.

TENNESSEE: Nashville—21,592 sq. yds. of "bitu-stone."

TEXAS: Austin—37,000 sq. yds. Finley method Tarvia, not including base, at 20c.; also 7,900 sq. yds. of rock asphalt at \$1.68, including base. Corsicana—39,338 sq. yds. of "vibrolithic" by contract at \$2.00. Pittsburg—12,000 sq. yds. "vibrolithic" by contract at \$1.90, including base.

VIRGINIA: Fredericksburg—gravel with asphalt surface binder, 20,156 sq. yds. by municipality at 22.66 cts. per square yard. Harrisonburg—19,948 sq. yds. of asphalt block by contract at \$2.64, including grading and 5-inch concrete base.

WASHINGTON: Raymond—plank road, 3-inch and 4-inch planks, 3,200 sq. yds., by the municipality, at \$0.50.

CANADA: Sydney, Nova Scotia—15,000 sq. yds. of slag and ashes by the municipality at \$0.40 a square yard, including excavation. Toronto, Ontario—5,849 sq. yds. of 11-inch "rocmac" at \$1.95, not including excavation.

SMOOTHING OUT WAVY STREETS.

How a California Town Planed Down a Bituminous Surface that had Slipped on a Smooth Foundation—Cheaper than Repaving.

Watsonville, California, last year tried successfully a method of removing from its main street the waves, or hills and hollows, which are said to be more or less common in California streets paved with natural bitumen. The street in question was paved some fifteen years ago with natural bitumen on a water-bound macadam base, after the macadam had been used for a few years and so thoroughly consolidated. The macadam was not roughened on top before applying the bituminous coating, and the latter did not make a satisfactory bond with the macadam, but soon began to crawl and produce the wavy effect referred to.

The supervisor of the road district, S. C. Marcus, built a scarifier with the idea of using it on this street, it being his idea that, even if the scarifier was not beneficial, the street could not well be made worse than it was at the time. The scarifier had four wheels and a long wheel base, and was provided with an I-beam frame so arranged that when any wheel should drop into a rut, the beams on either side would act like sled runners and prevent the scarifier points from digging in too deep. Twenty chisel points were set on a separate frame that could be raised or lowered at will. This scarifier was drawn by the steam roller. On the arrival of the first spell of warm weather, the street was swept clean and sprayed over very lightly with a solution of distillate and crude oil just ahead of the scarifier, this being necessary in order to get the broken pieces of the bituminous surface to anneal into the new surface. The scarifier, hauled by the road roller, cut shavings or chips from the high points of the bituminous surface, and men with rakes followed and raked the chips into the depressions. The road roller and scarifier passed back and forth over the road, and the chips so leveled into the depressions were consolidated and smoothed out by the steam roller on its next trip. No attempt was made to cut off an entire hump on a single trip, as this would have torn the pavement up in sheets and resulted in failure; but the chisel points were set so as to cut grooves totaling in width about half the surface passed over, and by continuing the work through several trips, the entire surface of each hump was finally cut down and the chips so formed filled and consolidated in the depressed points.

After the scarifying had been completed, the street was still somewhat rough, owing to the fact that the chips were of varying sizes and were very hard to rake into a good grade. To remedy this, the street was sprayed again with a solution of equal parts of distillate and crude oil, which acted as a solvent and softened the chips and the exposed part of the old surface. The pavement was then allowed to stand for a short time, after which a thin coat of granite screenings was spread over the street, and it was again rolled thoroughly with the steam roller. These screenings were left on for a week or ten days, after which the street was swept clean. Great care should be used in applying the distillate and crude oil solution, as a too heavy application would

(Continued on page 170.)

TABLE NO. 3B.—LOCAL DATA.

	No. of laborers available	No. of teams available	Nature of soil	Percentage of estimates retained	Charge for plans and specifications	Specifications obtainable from
Alabama:						
Gadsden .....	.....	.....	chert gravel	10	.....	.....
Tuscaloosa .....	.....	25	sandy clay	paymt in 6% bonds	none	City Engr.
Arizona:						
Globe	40	15	clay with boulders	% of contracts	\$10	City Clerk
Arkansas:						
Argenta	Plenty	plenty	sandy loam clay	usually 10	none	Engr. & City Clk.
Ft. Smith	100	25	clay	10	\$2	City Engr.
Helena	100	30	clay—firm	10	\$5	City Engr.
Hot Springs .....	.....	25	slate, rock, shale	20	\$25	Bd. of Commiss.
Mena .....	.....	10	sandy clay	.....	none	City Clerk
Pine Bluff	3,000 to 5,000	50 to 300	sandy, yellow clay	10 & 15	none to \$15	Engr. in charge
California:						
Alhambra	40	20	sandy loam	pd by assessment	none	City Clk. or Engr.
Anaheim	100	25	sandy loam	25	\$2	City Engr.
Glendale .....	.....	.....	sandy loam	no pay till complitd	cost deposited	.....
Long Beach .....	.....	.....	sandy adobe & clay	.....	.50c to \$3	City Engr.
Marysville	250	50	clay and sand	no pay till complitd	none	City Engr.
Ontario	100	50	sandy loam	30	\$5	City Engr.
Oxnard .....	.....	.....	sandy loam	.....	\$3	City Clerk
Palo Alto	30	12	loam & adobe	paid by assessmnt	\$2.50	City Clerk
Pomona	varies	varies	silt to gravel	none	none	City Engr.
Redondo Beach	100	30	sandy loam	paid when complitd	cost of blueprint	City Engr.
Richmond	200	50	adobe	none	\$5	Engr.
Riverside .....	.....	.....	red clay, adobe	pd by assessment	none	City Engr.
San Bernardino .....	.....	.....	adobe	.....	.....	City Engr.
San Jose	fair	fair	alluvial	pd when complitd	\$2.50	City Engr.
San Francisco .....	.....	.....	sand, clay, loam	25%	none till comple-	City Engr.
San Luis Obispo	100	30	adobe and loam	.....	none	City Engr.
Santa Ana	plenty	plenty	sand to adobe	.....	none	City Engr.
Sausalito .....	.....	.....	red clay & dirt	paid by assessmnt	\$10 deposit	City Engr.
Santa Monica	plenty	100	gravel & sand	.....	none	City Engr.
Vallejo	50	20	adobe	.....	\$5	City Engr.
Colorado:						
Denver .....	.....	.....	.....	10—15	none	City Engr.
Colorado Sprgs.	300	50	gravel	10	\$5	City Engr.
Leadville	100	20	.....	.....	none	City Clerk
Longmont	varies	varies	.....	10	none	City Engr. or Clk.
Monte Vista .....	.....	.....	sandy loam	15	.....	.....
Trinidad	plenty	plenty	shale, adobe, loam	.....	none	City Engr. or Clk.
Connecticut:						
Ansonia .....	.....	.....	gravel	15	none	City Engr.
Bridgeport	1,000	100	sand & gravel	15	none	City Engr.
Bristol .....	.....	.....	.....	15	\$10	City Engr.
Danielson .....	.....	20	gravel, hardpan	.....	.....	.....
Derby .....	.....	.....	.....	15	none	City Clerk
Hartford .....	.....	.....	.....	15	none	City Engr.
Manchester	150	50	sand & gravel	15	none	City Engr.
Meriden .....	.....	.....	gravel & sand	10	none	City Engr.
New Canaan .....	.....	.....	loam	10	\$10—refunded	Engr.
New Haven .....	.....	.....	sand	15	none	City Engr.
Simsbury .....	.....	.....	sandy loam	.....	.....	1st Selectman
Wallingford	25	12	.....	10	none	City Engr.
Dist. of Columbia:						
Washington	1,000	250	clay & gravel	10	.....	City Clerk
Florida:						
Ft. Wayne .....	.....	plenty	sandy	20	\$10	City Engr.
Live Oak	100	10	sand, loam, clay	10	.....	City Engr.
St. Augustine	300	20	sandy	15	none	Dir. Pub. Wks.
St. Petersburg .....	.....	.....	.....	.....	.....	.....
Tampa .....	.....	.....	sand	20	none	City Engr.
Georgia:						
Americus	100	12	red clay	.....	.....	.....
Brunswick .....	.....	.....	sand	.....	.....	.....
Gainesville	100	35	sandy loam	none	none	City Clerk
Tifton	100	5	porous pebbly clay	.....	.....	.....
Idaho:						
Boise .....	.....	25	sandy loam	15	none	City Engr.
Cour d'Alene .....	.....	.....	sandy loam gravel	.....	none	City Clerk
Twin Falls	plenty	plenty	lava ash	15	.....	.....
Illinois:						
Alton	100—200	30	clay	15	none	City Engr.
Aurora .....	.....	.....	varies	15	none	City Engr.
Belleville	100	20	clay	15	none	City Engr.
Cairo	500	100	clay & loam	15	none	City Engr.
Champaign	500	100	black loam	10	none	City Engr.
Chicago Heights	plenty	50 or 60	clay	15	\$5 to \$10	City Engr.
Collinsville	65	20	loam & clay	15	none if returned	City Clerk
East St. Louis .....	.....	.....	sand, gumbo, clay	10	.....	Bd Local Imprvts.
Elgin	200	25	gravel & clay	15	none	City Engr.
Evanston .....	.....	.....	varies	15	\$5 to \$25	Comr. Pub. Wks.
Fairfield	50	25	clay	15	none	.....
Freeport	300	50	loam & clay	20	\$5	City Engr.
Galena .....	.....	10 to 15	black loam & clay	.....	none	Bd Local Imprvts.
Galva .....	.....	plenty	black soil yel. clay	15	\$5	City Clerk
Gibson	few	few	black earth	15	none	City Clerk
Gillespie .....	.....	.....	.....	15	none	.....
Granite City	plenty	plenty	sandy	20	none	.....
Harrisburg .....	.....	.....	.....	10	.....	.....
Herrin	50	10	.....	10	nominal	City Clerk
Highland Park .....	.....	.....	black loam & clay	15	none or slight	City Clerk
Hillsboro	100	10	clay	15	\$5	City Clerk
Kankakee .....	.....	.....	.....	15	none	.....
La Grange .....	.....	.....	clay & loam	15	none	City Engr. or Clk.
Lake Forest	200	40	clay	15	none	City Engr. or Clk.
Marion	150	40	clay	10	none	City Engr.
Mattoon	150	25	black loam	10	none	City Engr.
Moline	few	50	yellow clay	15	none	City Engr.
Normal	imported	8 to 10	black	20	none	City Clerk
Oak Park .....	.....	.....	black loam, clay	15	none	.....
Ottawa .....	.....	.....	.....	15	none	on file Engr. office
Paris .....	.....	.....	black soil	15	none	City Clerk
Pontiac .....	.....	.....	black loam	20	no fixed charge	City Engr.
Robinson	few	10 to 20	clay	20	none	City Engr.
St. Charles	25—30	10 to 15	clay	15	\$10	.....
Streator	100 or more	6 to 12	black soil, clay	20%	5.00 (returnable)	City Engr.
Taylorville	100	40	loam & muck	20	none—or cost	City Engr.
Waukeegan .....	.....	.....	sandy clay	15	none	City Engr.

For footnotes, see page 170.

TABLE 3B.—LOCAL DATA.—Continued.

	No. of laborers available	No. of teams available	Nature of soil	Percentage of estimates retained	Charge for plans and specifications	Specifications obtained from
Indiana:						
Anderson	300	75	clay grav'l sub soil	20	on file	City Engr.
Angola	25	10	clay	35	none	City Clerk
Bedford	few	plenty	clay	.....	none	.....
Crawfordsville..	300	100	sandy loam	.....	\$10	City Engr.
Crown Point ..	25	10	clay	35	none	City Engr.
Decatur .....	.....	.....	.....	.....	none	City Clerk
Elkhart	100	30	sandy loam	all	none	City Engr.
Fort Wayne	800	150	clay	all	none	Bd. Pub. Wks.
Frankfort	50	30	clay	*	\$5	City Engr.
Franklin	40	12	sand & clay	35	.....	City Engr.
Garv	500	60	sand	85	\$1 per set	City Engr.
Goshen	40 to 50	25	gravel & clay	35	\$2	City Engr.
Greencastle	100	35	clay	35	none in state—\$10	City Engr.
Greenwood	30	15	clay	.....	\$5	City Engr.
Huntington	250	40	clay & rock	none	\$1	City Engr.
Lafayette	60	30	gravel & clay	pd on compl'n	no fixed amount	City Engr.
Laporte	30	20	clay	35	none	City Engr.
Lebanon	100	50	gravel	pd on compl'n	none	City Clerk.—1 copy
Logansport	100	30	gravel	35	2 1/2 %	City Engr.
Madison	75	20	clay & black loam	none	none	City Engr.
Muncie	300	40	.....	.....	none	City Engr.
New Albany .....	.....	.....	.....	.....	.....	Co. Surveyor
Noblesville	25 to 30	15	clay	20	.....	City Engr.
North Vernon ..	40	30	clay	35	none	City Engr.
Peru	150	40	loam & gravel	pd on compl'n	none	City Engr.
Portland	150	50	clay, loam	20	none	City Engr.
Plymouth	75	35	sand, loam	20	5% contract	City Engr.
Richmond	50	25	loam, clay, gravel	monthly estimates	\$1	City Engr.
Seymour	100	40	sandy clay	20	none	City Engr.
Shelbyville	60	20	18" dense soil-clay	.....	none	City Engr.
Somersville	100	30	gravelly	.....	none	City Engr.
South Bend .....	.....	.....	sand, loam, gravel	35	.....	Clk. B. of Pub. W.
Sullivan	100	25	clay	contr. takes bonds	\$5 deposit	City Engr.
Terre Haute .....	.....	.....	sand, loam, gravel	no pay till ended	\$5	City Engr.
Tipton	40	15	black loam, clay	up to 80%	\$3 to \$5	City Engr.
Vincennes	500	50	varies	bonds on compl'n	none	City Engr.
Wabash	50	25	rock, clay, gravel	none given	none	City Engr.
West Lafayette..	40	20	black loam, gravel	no pay till done	none	.....
Iowa:						
Ames	20 or 30	20	black loam	none till done	none	City Engr.
Bloomfield	50	.....	black soil	.....	none	Clerk
Burlington .....	.....	.....	blk loam, yel. clay	.....	none	City Engr.
Cedar Rapids ..	700	200	black loam	15% on bond wk	.....	City Clerk
Clarion	10	12	black loam	no pay till ended	none	City Clerk
Clinton	200	50	blk loam, clay, sd	none given	\$3 to \$10	City Engr.
Cresco .....	.....	.....	.....	.....	none	City Clerk
Creston	50 or 100	50	black loam	no pay till ended	\$2 to \$5	City Engr.
Davenport .....	.....	.....	.....	.....	.....	Clk. B. of Pub. W.
Denison	few	few	yellow clay	.....	none	City Engr.
Eagle Grove ..	65	15	gumbo	.....	none	City Engr.
Glenwood .....	.....	10	loess	pd in certificates	none	City Engr.
Grinnell	imported	10 to 20	bl'k prairie soil	20	cast	City Engr.
Indianola	20 or 40	25 to 30	or humus	.....	when sent out, \$5	City Engr.
Iowa Falls	25	15	black loam	.....	none	.....
Knoxville	100	40	loam or clay, rock	no estimates	.....	.....
Marshalltown ..	50	20	and sand	.....	.....	City Clerk
Muscatine	100	40	loam	certf. at finish	none	City Engr.
Oelwein	insufficient	insufficient	clay, loam	no monthly estmt.	\$2	City Engr.
Perry	50	20	clay, loam	no pay till ended	none	City Engr.
Spencer	none	10	black loam	pay on completion	none	City Engr.
Sumner .....	.....	.....	loam	no monthly est.	none	City Engr.
Watertown .....	.....	.....	.....	.....	\$2	City Engr.
Waverly	20	12	black heavy soil	15	absent \$5	City Clerk
Webster City...	25	10	gumbo & gravel	.....	none	City Clerk
Kansas:						
Abilene	5	15	sandy loam	20	\$3	Engineers
Atchison	400	50	.....	15	none	City Engr.
Dodge City	50-60	20	sandy loam	10	none	City Engr.
Girard	150	20	bl'k soil & gumbo	10	\$1	City Clerk
Hutchinson .....	.....	.....	.....	15	.....	City Engr.
Iola	150	50	clay loam	10	\$3	City Clerk
Larned .....	.....	.....	sand & clay	10	(10 (returnable))	City Engr.
Manhattan	50-75	20	sand-gumbo	15	\$1	City Mgr.
Neodesha	100	15	gumbo over clay	on complet'n	\$1	City Engr.
Newton	50	25	hard, red clay	15	none	City Engr.
Olathe	100	35	clay loam	20	none	City Engr.
Ottawa	100	20	heavy bl'k gumbo	no monthly est.	\$1	City Engr.
Pittsburg .....	.....	.....	black loam, clay	10	\$5	City Engr.
Rosedale	no limit	.....	rocky	10	none	City Engr.
Salina	200	40	sandy loam	20	\$2 per set	City Clerk
Topeka	200	100	loam & gumbo	10	none	City Engr.
Wellington	50	20	gumbo	10	none	City Engr.
Kentucky:						
Carlisle	130	20	clay	10 to 20	\$2	.....
Lexington	300	100	heavy clay	20	none	Comr. of Pub. W.
Maysville	150	50	sand & clay	.....	.....	City Engr.
Middlesboro ...	scarce	scarce	sand, clay	.....	plans on file	.....
Paducah	400	50	clay	35	none	Comr. Pub. Wks.
Louisiana:						
Donaldsonville..	200	50	sandy	.....	.....	.....
Kentwood	800	40	red clay-hard	20	none	City Council
Lake Charles...	500	100	sandy loam	.....	none	City Engr.
New Orleans...	indefinite	600	buckshot clay	about 20%	\$75	City Engr.
Shreveport	hundreds	.....	sand & red clay work done by city	.....	.....	.....
Maine:						
Bangor	300	100	clay	15	none	City Engr.
Biddeford	100	20	clay, gravel ledge	10	none	City Engr.
Waterville .....	.....	.....	gravel & sand	20	none	City Engr.
Maryland:						
Baltimore .....	.....	.....	.....	20	{ \$5 returned if }	Pav. Comn.
Easton	50-150	.....	{ sandy clay— }	15	{ bid is placed }	Town Clerk
Westminster ..	25	5	{ clay & gravel }	.....	\$2-\$5	.....
			shale	.....	.....	St. Comr.

For footnotes, see page 170.

TABLE 3B.—LOCAL DATA.—Continued.

	No. of laborers available	No. of teams available	Nature of soil	Percentage of estimates retain'd	Charge for plans and specificat'ns	Specifications obtained from
Massachusetts:						
Adams Twp....	80	30	.....	15	none	Town Engr.
Arlington .....	.....	.....	.....	20	\$1	.....
Boston .....	.....	.....	variable	15	none	.....
Braintree	none	10	{ clay—hard }	.....	.....	Mass. Hwy. Comn.
Concord .....	.....	10	{ sand-gravel }	.....	.....	.....
Fitchburg .....	.....	.....	loam-s'd unders'l	.....	.....	Street Comn.
Greenfield .....	.....	100	clay	15	none	Town Engr.
Haverhill	170	35	clay & alluvium	.....	.....	.....
Lawrence .....	.....	.....	sand	.....	.....	Engr. in charge
Leominster	75	30	clay and sand	15	\$5	Supt. of Streets
Loell .....	.....	25-30	gravel & sand	15	.....	.....
Manchester	few	20	ledge & clay	15	none	Bd. of Selectmen
Newton	150	25-100	sand, clay, gravel	15	none	St. Comr.
North Adams ..	100	15	gravel	.....	.....	Comr. Pub. Wks.
Peabody	200	30	sand & yellow cl	15	.....	City Engr.
Quincy	few	.....	varies	15	\$10	Comr. Pub. Wks.
Walpole	20	12	gravel	.....	.....	.....
Waltham .....	.....	.....	varies	.....	none	City Engr.
Watertown	none	none	varies	.....	.....	.....
Webster	few	6	gravely clay	15	none	City Engr.
Westfield	100	10	loam & gravel	10	none	Town Engr.
Worcester .....	.....	.....	gravel & hardpan	.....	.....	.....
Michigan:						
Adrian	25	12	Sand, clay, loam	.....	.....	.....
Alpena	70-80	15	sand	.....	.....	City Mgr.
Ann Arbor .....	.....	.....	gravelly	10	none	City Engr.
Bay City	100	20	clay loam	10	none	City Engr.
Belding	30	7	sand & gravel	7½	.....	City Clerk
Big Rapids	20-40	20-30	red clay, l'ht sand	no specification	.....	.....
Cadillac .....	.....	20	sandy	.....	.....	.....
Detroit	1,500	200	sand & clay	{ paid by bonds }	none	Dept. of P. Wks.
Flint .....	.....	.....	.....	{ when c'pleted }	.....	.....
Grand Rapids ..	2,000	100	sand & clay	.....	.....	.....
Holland	250	50	gravel, clay, sand	10	none	City Engr.
Holland	100	50	sand	15	none	City Engr.
Ionia	100	20	sand & clay	10	none	Engr.
Kalamazoo .....	.....	.....	.....	20	none	City Engr.
Marquette	300	20	sand	varies	none	City Clerk
Monroe .....	.....	25	clay	10	.....	.....
Muskegon	plenty	25	sandy loam	10	none	City Recorder
Niles	plenty	plenty	sand, gravel, clay	20	none	City Clerk
Petoskey	50	10	sand, gravel, clay	10	.....	City Clerk
Port Huron .....	.....	.....	sand, clay	15	none	City Engr.
Saginaw	sufficient	sufficient	clay	20	plans on file	City Engr.
St. Johns	insufficient	insufficient	clay loam	35	none	City Clerk
South Haven ..	limited	limited	sand & clay	.....	.....	.....
Sturgis	30	10	black loam	30	none	City Clerk
Minnesota:						
Duluth	plenty	plenty	r. clay, sand, rock	15	\$1	City Engr.
Eveleth	scarce	.....	clay & boulder	10	.....	City Engr.
Fairmont	75	25	loam & yel'w clay	20	.....	City Engr.
Fairbault	600-800	150-200	gravel & clay	15	.....	City Recorder
Hibbing	200	25	clay	15	\$5	Village Engr.
Mankato	50	10	black loam	85	none	City Engr.
New Ulm	300-500	40-50	clay gravel	20	none	City Engr.
Northfield	plenty	plenty	.....	.....	.....	.....
Rochester	scarce	scarce	clay & sand	25	actual cost	City Engr.
St. Cloud	100	30	sandy	15	none	City Engr.
St. Paul .....	.....	.....	.....	15	none	Office Engr.
Stillwater .....	.....	.....	clay & rock	20	\$5	City Engr.
Virginia	plenty	plenty	sandy clay	15	not printed	City Engr.
Mississippi:						
Columbus	500	50	sand, clay sub-sl	15	\$2-\$10	City Secy.
Vicksburg	200	35	loam	25	none	City Engr.
Missouri:						
Bethany	100	20-30	l'm. clay sub-soil	{ rd. in tax b'ls }	varies	City Clerk
Boonville	50 or more	10-15	sandy loam	{ on completion }	none	City Clerk
Brookfield	25	6 to 10	blk. gray & clay	.....	\$5	City Engr.
Cameron .....	.....	50	{ blk loam over }	{ tax bills on }	.....	.....
.....	.....	.....	{ yellow clay }	{ completion }	{ Exam. of of'ce }	City Engr.
Cape Girardeau ..	200	40	clay	t'x bills at compl.	\$5	City Engr.
Carterville	100	25	red clay	.....	.....	City Clerk
Caruthersville ..	100	25	sandy loam	.....	\$5	City Engr.
Fulton .....	.....	.....	soil & yel. clay	paid by tax bills	none	City Engr.
Hannibal .....	.....	40	clay	.....	none	City Engr.
Independence ..	.....	100 or more	blk. l'm.s'soil, clay	no monthly esti.	none	City Engr.
Kirkwood	50	10	yellow clay	tax bills	\$15	City Engr.
Liberty	100	15	clay & blk. loam	spec. tax bill w'k	none	City Engr.
Moberly	200	50	hardpan & clay	{ p'd by t'x bill }	none	City Clerk
.....	.....	.....	.....	{ on completion }	.....	.....
St. Charles	50	20	sandy clay	special tax bills	none	City Engr.
Sedalia	250	40	loam & stiff clay	no monthly esti.	none	City Engr.
Montana:						
Anaconda	no limit	70	sand, gravel	10	\$5-\$10	City Engr.
Bozeman	300	100	black loam	10	\$5	City Engr.
Butte .....	.....	plenty	{ decomposed }	90 allowed	\$5 returnable	Comr. Pub. W'ks
.....	.....	.....	{ gran. & sand }	.....	.....	.....
Great Falls .....	.....	.....	.....	20	\$2	City Engr.
Helena	plenty	plenty	good	10	\$5 deposit	City Engr.
Livingston	25	20	gravel	10	\$2 to \$5	City Clerk
Nebraska:						
Benson	300 dr. on Omaha	25	clay	10	none	City Engr.
Fremont	100	30	sandy loam	20	none	City Engr.
Grand Island ..	.....	.....	.....	.....	.....	City Clerk
Hastings	100	25	loam	.....	.....	City Clerk
Kearney	100	40	black loam	25	\$1	City Clerk
Lincoln	50-200	75	loam above }	30	none	City Engr.
.....	.....	.....	{ stiff clay }	.....	.....	.....
Nebraska City ..	100	20	clay	15	none	City Clerk
Norfolk	50	25	clay & gumbo	10	none	City Clerk
North Platte ..	30-50	50	clay & sand	15	none	City Clerk
York	200	35	rich black loam	15	none	City Engr.
New Hampshire:						
Laconia .....	.....	plenty	clay & gravel	.....	.....	.....
Nashua	200	40	sand & gravel	.....	.....	.....
Somersworth ..	enough	plenty	sandy	.....	no bid work	City Clerk

For footnotes, see page 170.

TABLE 3B.—LOCAL DATA.—Continued.

	No. of laborers available	No. of teams available	Nature of soil	Percentage of estimates retained	Charge for plans and specifications	Specifications obtained from
New Jersey:						
Atlantic City...	.....	.....	.....	15	none	City Engr.
Bloomfield .....	.....	.....	.....	20	none	Town Engr.
Boonton	200	20	sand, clay, stones	10	none	City Engr.
Camden	1,000	30	{ sand & clay }	10	none	City Engr.
Cape May	50	15	{ stratified }	.....	.....	.....
Deal	few	few	sandy gr'v'l, loam	20	\$5	City Engr.
East Orange .....	.....	.....	clay & sand	20	none	City Engr.
Hackensack .....	.....	.....	sandy clay	20	none	City Engr.
Long Branch	200	50	.....	20	none	.....
Madison	150	20-40	clay	20	none	City Clerk
Millville	50	20	clay, gravel	10	none	Boro Engr.
Montclair	200	50	sandy	20	no set price	City Engr.
Newton	none	none	clayey loam	20	none	Town Engr.
Orange	100	15	sand & clay	20	\$5	City Engr.
Passaic	plenty	25	gravelly	20	none	City Engr.
Plainfield	20	20	Clay, gravel, sand	10	cost of prints	.....
Ridgefield Park .....	.....	4	{ yellow clay, }	15-20	plans on file	.....
Ridgewood	100	25	{ sandy clay }	.....	.....	.....
Rutherford	300	50	{ sand & clay }	20	none	City Engr.
Somerville	few	6	{ clay, gravel, }	15-20	none	Engrg. Dept.
South Amboy	scarce	.....	{ over shale & }	.....	.....	.....
Summit .....	.....	.....	{ sandstone }	20	.....	.....
Trenton	200	50	shale	20	monthly usually	City Engr.
Verona & Glen Ridge .....	.....	.....	sandy	10	none	City Engr.
Westfield	100	20	sandy loam	25	\$1	Engr. of Streets
West Hoboken	none	none	sand, gravel, clay	20	.....	.....
West N. York	100	30	.....	15 to 20	.....	.....
West Orange .....	.....	plenty	{ hard sand, }	20	none	Town Surveyor
New Mexico:						
Albuquerque ...	.....	200	{ clay gravel }	20	none	Town Clerk
New York:						
Albany .....	.....	.....	humus	20	none	Town Engr.
Auburn .....	.....	.....	clay & loam	15	.....	.....
Binghamton .....	.....	.....	gravel	15	none	City Engr.
Bronxville	450	25	hard clay	10-15	\$5 per copy	City Engr.
Buffalo .....	.....	.....	.....	20	\$2	City Engr.
Depew	30-40	.....	clay or sand	20	\$10	Village Engr.
Dolgeville	none	2 or 3	clay	10	none for specifi.	City Engr.
Ellenville .....	.....	.....	{ sand, gravel, }	20	furnished	Village Engr.
Elmira	few	.....	{ clay, loam }	.....	.....	Clerk
Geneva	500	25	loam, grav., cobble	25	.....	.....
Gloversville	40-50	8-10	gravel & loam	30	none	City Engr.
Herkimer	300	40	clay	25	none	City Engr.
Hudson .....	.....	60	sand & gravel	all	none	City Clerk
Lackawanna	500	none	clayey loam	25	\$5	City Clerk
Lancaster	20-30	5-10	clay	10	deposit return.	Sunt. Pub. Wks.
Little Falls .....	.....	.....	clay, hard pan	10	\$10 returned	Dept. Pub. Wks.
Lockport .....	.....	.....	red clay	10	none	Village Engr.
Mamaroneck	100	30	.....	15	none	City Engr.
Massena	200	50	.....	15	none	Village Clerk
Medina	Paving done by State Highway Department.					
Middletown	75-100	15-20	clay, sand, gravel	10	none	City Engr.
New York City:						
Brooklyn ....	.....	.....	.....	.....	.....	.....
Manhattan ..	.....	.....	loam & sand	10-15	none	{ Chf. Engr., Bureau of Highways }
Queens .....	.....	.....	earth & clay	{ 15 on assess- }	none	Ch. Engr. Hgwys.
Bronx .....	.....	.....	{ ment, 10 on appropriat'n }	.....	.....	.....
Niagara Falls ..	30	15	sand, clay, gravel	10	none, usually	Engr. Highways
Ogdensburg ...	.....	.....	.....	15	none	Ch. En. Hgwys.
Olean .....	.....	.....	red clay	{ no monthly estimate, 5% on final }	none	City Engr.
Oneida	60	15	{ clay, sandy }	.....	.....	.....
Oneonta	varies	varies	{ loam, rock }	.....	none	City Clerk
Plattsburgh	50-200	10-50	{ hard pan }	10	none	City Clerk
Port Jervis .....	.....	.....	{ soft earth, }	15	\$5-\$20	City Engr.
Salamanca	100	15	{ clay, gravel }	10	\$2	City Clerk
Scotia Village ..	plenty	plenty	sand	15	none	City Clerk
Sidney	50	10	gravel	.....	{ of vil- }	Village Clerk
Suffern	15	6	gravel	.....	lage—nothing }	Village Clerk
Syracuse	100	.....	all kinds	25	none	Village Clerk
Tuckahoe	250	25	varies	20	none	City Engr.
Watertown	scarce	enough	clay	10	\$10 deposit	Town Engr.
Waverly	100	25	{ top loam }	10-15	none	City Engr.
North Carolina:						
Burlington	50	10-15	{ then gravel }	.....	.....	.....
Charlotte	1,500	500	red clay	10	\$10-\$15	City Engr.
Durham .....	.....	.....	red clay	10	none	City Engr.
Gastonia .....	.....	.....	clay	15	\$10	City Engr.
Goldsboro	1,000	25	clay	10	none	City Engr.
Greensboro	scarce	20-30	sand	10	none	City Clerk
Kinston .....	.....	.....	.....	15	none	City Engr.
Monroe	200	25	sandy	.....	.....	.....
Wilmington ...	plenty	plenty	rocky	20	\$5	City Clerk
North Dakota:						
Bismarck	200	100	sand & clay-loam	15	none	City Engr.
Carrington ....	.....	.....	sandy loam	15%	none	.....
Fargo	Indefinite no.	100 or more	black loam, clay	15	none	City Engr.
Grand Forks ..	.....	.....	{ clay, loam & }	15	none	City Engr.
			{ hard clay }	15	none	City Engr.

For footnotes, see page 170.

TABLE 3B.—LOCAL DATA.—Continued.

	No. of laborers available.	No. of teams available.	Nature of soil	Percentage of estimates retained	Charge for plans and specifications	Specifications obtained from
Ohio:						
Ada	30	10	loam	20	\$5	City Clerk
Ashtabula .....	.....	.....	clay	10	none	City Engr.
Bucyrus	50	10	clay	10	none	City Engr.
Cambridge .....	.....	.....	clay	20	{ Specifications 15 cts. for mailing }	City Engr.
Cedarville .....	.....	.....	{ stone 2 feet under surface }	10	none	Village Clerk
Cincinnati .....	.....	.....	gravel & clay	20	\$2	City Engr.
Cleveland .....	.....	.....	sand & clay	10	none	Engr. of Paving
Columbus .....	.....	.....	clay & gravel	10	.....	City Engr.
Delaware	75	20	heavy clay	10	none	City Engr.
East Liverpool	few	few	grav. & sandy clay	10	.....	City Engr.
East Palestine	none	few	clay & grav. clay	20	usually none	Village Clerk
Eaton	50	15	clay	15	\$5 per set	City Engr.
Findlay	60	25	sand, clay	20	none	City Engr.
Fostoria	15	10	loam	10	none	City Engr.
Franklin .....	.....	35	black loam	10	none	.....
Galion .....	.....	20	clay	15	none	Dir. Pub. Service
Granville .....	.....	10	gravel	15	\$10	Engr. & Clerk
Hamilton	250	50	gravel	20	\$2	City Engr.
Kent	scarce	scarce	gravel & clay	15	none	City Engr.
Lakewood .....	.....	.....	clay	10	none	City Engr.
Lancaster	60	20	loam & gravel	10	none furnished	Dir. Pub. Service
Lima .....	.....	.....	.....	10	none	City Engr.
Logan	100	20	clay & sand	10	none	City Engr.
London .....	.....	.....	.....	25	none	City Engr.
Lorain	few	plenty	clay	10	none	City Engr.
Marion	200	30	clay	10	none	City Engr.
Massillon	200	25	gravel & clay	20	none	Dir. Pub. Service
Milford	20	10	sandy loam	15	none	Village Clerk
Mt. Gilead	20	15	clay	10	\$1	Village Engr.
Newark	uncertain	20	glacial	{ 10—sewers 5—paving }	none	City Engr.
New Boston	500	75	clayey	10	\$5 per set of sts.	Village Engr.
Orrville	20	10	clay	15	.....	City Clerk
Piqua	plenty	plenty	gravel	10	\$1	Dept. Pub. Serv.
Port Clinton	100	.....	gravel	15	none	.....
Springfield	short	sufficient	gravel	10	none	City Mgr.
Steubenville .....	.....	40	gravel & clay	.....	none	City Engr.
Toledo .....	.....	.....	sub soil	.....	.....	.....
Toronto	50	4	clay & sand	15%	none	City Engr.
Troy	none	5	sand & gravel	15	50c. each	City Engr.
Urbana	100	15	gravel & loam	15	\$1	Dir. Pub. Service
Xenia	50	20	gravel	10	none	City Engr.
Youngstown .....	.....	.....	clay	20	none	City Engr.
Zanesville	200	50	{ sand, yellow clay & shale }	10	none	Dir. Pub. Service
Oklahoma:						
Bartlesville	30-40	varies	{ lime & sand- stone, loam, clay, shale }	pay on compl'n	\$5	City Engr.
Elk City	30-50	10-20	sandy loam	20	\$5	City Engr.
Enid .....	.....	.....	brown sandy loam	.....	.....	.....
Frederick .....	.....	.....	hard	.....	.....	.....
McAlister	50	15	clay to gumbo	85 pd.	none	City Engr.
Norman .....	.....	.....	{ yellow clay & gumbo }	.....	none	.....
Sapulpa	none	none	sandy loam	10	none	City Engr.
Shawnee	few	few	.....	10	\$5	City Engr.
Oregon:						
Baker .....	.....	.....	{ loam, sand, } { lava ash }	.....	none	City Clerk
Eugene .....	.....	.....	.....	20	none	City Engr.
McMinnville ...	150	25	{ black loam & } { sandy clay }	{ monthly estl. } { not allowed } { monthly estl. }	\$5 returnable	City Engr.
Portland .....	.....	.....	.....	{ not rendered }	actual cost	Dept. Pub. Works
Roseburg	50	25	black adobe	20	actual cost	City Engr.
West Linn .....	.....	30	blk & sandy loam	20	none	City Recorder
Pennsylvania:						
Allentown .....	.....	.....	clay	10	\$15	City Engr.
Beaver Falls ...	.....	.....	gravel	15	none	City Engr.
Bethlehem	very few	50	clay	15	none	Boro Engr.
Bloomsburg ...	75	10	loam	25	none	W. H. Eyer
Bradford	50	20	clayey loam	15	none	City Engr.
Butler	75	50	soapy clay	10	none	City Engr.
Carbondale	scarce	plenty	sandy gravel	10	none	City Engr.
Chambersburg ..	30	8	clay	15	\$5	Boro Engr.
Clearfield	50	10	clay & gravel	10	none	Boro Engr.
Connellsville ..	.....	.....	.....	10	.....	City Engr.
Cresson .....	.....	.....	.....	15	\$15	.....
Duquesne .....	.....	.....	various	15	none	Boro Engr.
Ellwood City ...	.....	.....	.....	20	none	City Engr.
Erie	scarce	.....	gravel & sand	25	none	City Engr.
Farrell	200	40	.....	15	nominal	.....
Franklin .....	.....	.....	clay	10	none	City Clk or Engr.
Freeland	50	5 or 6	shale & gravel	40	none	Engineer
Greensburg	none	few	limestone, clay	10	none \$	Boro. Engr.
Hanover	scarce	.....	yellow clay	20	.....	A. E. Kohr
Hazleton	scarce	plentiful	.....	10	\$5	City Engr.
Holidaysburg ..	.....	.....	.....	15	.....	.....
Johnstown	uncertain	20 or 25	clay	20	deposit	City Engr.
Juniata .....	.....	.....	clay, shale	15	none	Boro. Engr.
Kingston	scarce	.....	loam	10	deposit	Engineers
Lansford	scarce	.....	hard clay	15	none	{ Lehigh Coal & Nav. Co. Engr.
Larksville .....	.....	10	loam & gravel	10	\$5	.....
Lewisburg	50	.....	.....	25	none	Engineer
McKeesport ...	200	50	clay & shale	10	\$1	City Engr.
Meadville	75 or 100	15 or 20	gravel & clay	15	none	City Engr.
Mechanicsburg ..	75	9	{ clay; limestone below 5 ft. }	15	none	City Engr.
Mount Union ..	.....	.....	.....	15	\$10	Boro. Engr.
New Castle	60	25	loam & sand	.....	none	C. H. Milholland
Norristown	not enough	fair	shale	80	.....	Boro. Engr.
North East .....	.....	.....	gravel, loam	15 to 20	none	City Clerk
Northumberland	10	5	gravel, ashes	20	none	Clerk of Council

For footnotes, see page 169.

TABLE 3B.—LOCAL DATA.—Continued.

	No. of laborers available	No. of teams available	Nature of soil	Percentage of estimates retained	Charge for plans and specifications	Specifications obtained from
Pennsylvania (continued):						
Oil City	25	5	various	20	none	City Engr.
Punksbawney ..	50	12	clay, sand, gravel	10	none	Boro. Engr.
Rankin	few	.....	clay	10	none †	Boro. Engr.
Royersford	none	sufficient	sufficient	medium	kept in office	.....
Scranton .....	.....	.....	sandy clay	10	none	Boro. Engr.
Sewickley .....	.....	.....	clay	10	none	Clerk of Council
Somerset	30	10	.....	15	\$3	L. R. Owen
South Fork	very few	6	limestone	25	\$10	Boro Secretary
Steelton	50 to 100	10 to 20	{ clay, gravel	10	none	City Engr.
Tyrone .....	.....	.....	{ limestone	.....	.....	.....
Uniontown	very few	10 to 15	clay	20	\$3	City Engr.
Washington	none	25	limestone	10	none	City Engr.
Waynesboro	40	10	clay	20	\$5	City Engr.
W. Hazelton	50	10	rock & clay	10	\$1	Boro. Engr.
W. Homestead ..	.....	.....	.....	15	\$10	{ C. E. Long, Pittsburgh.
Williamsport ..	.....	.....	.....	10	.....	City Engr.
York	scarce	.....	clay	20	none	City Engr.
Rhode Island:						
Providence .....	.....	.....	sand, hardpan	15	none	City Engr.
Woonsocket .....	.....	100	sand, gravel, clay	.....	.....	.....
South Carolina:						
Bennettsville ..	scarce	.....	sand	.....	.....	.....
Charleston	unlimited	50	sand	20%	none	City Engr.
Clinton	22	4	clay	.....	.....	.....
Florence	100 †	25 to 30	sandy loam, clay	15	\$5	.....
Greenville	enough	enough	clay, rock	15	\$5	City Engr.
Spartanburg .....	.....	.....	.....	.....	.....	.....
South Dakota:						
Aberdeen	plenty	plenty	loam	15	\$5 deposit	City Engr.
Deadwood	100	30	clay, gravel	25	none	City Engr.
Huron	50 to 75	15	sandy clay	pd by assessment	\$3	City Engr.
Lead	rather scarce	5	clay, wash	20	\$5	City Engr.
Madison	100	15	loam, clay	no monthly est.	\$10	City Engr.
Mitchell	50	35	clay	no monthly est. †	\$5	City Engr.
Sioux Falls	500	150	clay, loam	no monthly est.	none	City Engr.
Watertown	300	40	sandy loam	20	\$5	City Engr.
Yankton	100	20	loam, clay	15	none	City Engr.
Tennessee:						
Clarkville	200	25	clay, loam	none	.....	City Engr.
Dyersburg	plenty	plenty	clay, loam	10	none	City Engr.
Jackson	300	50	red clay, loam	10	none	City Engr.
Memphis	plenty	plenty	porous red clay	20	\$5 deposit	City Engr.
Morristown	200	40	{ black gravelly loam	20	none	City Engr.
Texas:						
Beeville	50	.....	sandy loam	.....	.....	City Engr.
Brownwood	150	50	sand, clay	.....	.....	.....
Cleburne	150	30	sandy clay	10	none	City Engr.
Corsicana	250	60	{ black wax, sandy loam	15	\$10	City Secretary
Corpus Christi ..	200	50	clay, black dirt	10	none	City Engr.
Greenville	100	50	black wax	15	none	City Engr.
Houston .....	.....	.....	gumbo	20	\$2 deposit	Clerk
Houston Hgts. ..	.....	.....	sand, black wax	15	none	.....
Port Arthur	50 to 100	25 to 50	black wax	10	none	City Clerk
Pittsburg	250	75	sandy clay	.....	.....	.....
San Angelo	100	20	{ adobe, disinte- grated limestone	.....	.....	.....
Sulphur Springs ..	100	50	sandy	15	.....	City Engr.
Texarkana .....	.....	50	sand, clay	10	\$1	City Engr.
Utah:						
Logan	enough	enough	gravel	no monthly est.	\$5	City Engr.
Salt Lake City ..	500	150	loam & gravel	15%	5.00 deposit	City Engr.
Vermont:						
Montpelier	100	15	clay	15	.....	J. O. Goodrich
Newport .....	.....	.....	.....	20	nominal	.....
Virginia:						
Danville	100	20	sandy	15	.....	.....
Harrisonburg ..	.....	8 to 10	{ clay, limestone slate	10	none	City Engr.
Newport News ..	.....	50 †	sandy loam	10	none	City Engr.
Staunton	150	20	clay	.....	none	City Manager
Washington:						
Bellingham .....	.....	.....	{ loam, clay sand, rock	no monthly est.	\$5 deposit	Comptroller
Bremerton	50	20	sand, gravel, clay	30	\$5	City Engr.
Everett .....	.....	.....	.....	20	\$1 deposit	City Engr.
Ilwaco	50	10	sandy	20	\$2	City Engr.
Mt. Vernon	very few	very few	sandy loam gravel	25	\$10	City Engr.
North Yakima ..	very scarce	insufficient	{ volcanic ash gravel	no monthly est.	\$2—\$10 deposit	City Engr.
Olympia	150	15	sandy clay	30	\$5	City Clerk
Port Angeles ..	.....	10 to 15	gravely loam	25	deposit	City Engr.
Pullman	25	6	heavy, black clay	paid by bonds	\$5	City Clerk
Puyallup .....	.....	.....	sand, clay	no monthly est.	\$5	City Clerk
Raymond	25 to 50	5 to 10	clay, loam	25	none	City Engr.
Spokane .....	.....	.....	gravel	no monthly est.	none	City Engr.
Walla Walla ..	.....	50 to 100	gravely loam	no monthly est.	cost	City Engr.
Wenatchee	100	25	volcanic ash	10	\$5	City Engr.
West Virginia:						
Huntington	400	60	clay, sand	10	none	City Engr.
Martinsburg	50	25	limestone	.....	none	City Engr.
Moundsville	plenty	plenty	clay, sand	10	none	City Engr.
Parkersburg	150	50	clay, loam	10% of final	\$5	City Engr.
Wisconsin:						
Anpleton .....	.....	.....	.....	20	\$5 deposit	City Engr.
Beloit	150	30	gravel, sand loam	20	actual cost	City Engr.
Burlington	15	8	loam, gravel	20	none	City Engr.
Columbus	40 to 60	15 to 20	loam & blue clay	20	none	Clerk
De Pere	varies	.....	clay	p.l. on completion	usually none	City Clerk
Eau Claire	200	50	sand & gravel	15	{ none in city \$5 outside	City Engr.
Fond du Lac	few	10	{ clay loam red clay	{ no monthly est. final only	none	City Engr.

For footnotes, see page 170.

TABLE 3B.—LOCAL DATA.—Continued.

	No. of laborers available	No. of teams available	Nature of soil	Percentage of estimates retained	Charge for plans and specifications	Specifications obtained from
Wisconsin (con- tinued):						
Green Bay .....	.....	.....	sand, gravel, clay	25	none	City Engr.
Janesville .....	.....	.....	clay	tax bill work	none	City Engr.
Jefferson	scarce	scarce	clay, loam	.....	none	City Clerk
Lake Geneva ..	20	6	gravel, sand, clay	10	none	City Clerk
Madison	300	75	clay	80	none	City Engr.
Menasha	100	15	clay	.....	none	Bd. Pub. Wks.
Milwaukee .....	.....	.....	clay	80	none	City Engr.
Neenah	150	20	sandy, light soil	.....	none	.....
New London ...	100	20	clay	20	none	City Engr.
Oshkosh .....	.....	.....	sandy	10	\$2 deposit	City Clerk
Portage	100	50	{ loam, sand	15 to 25	.....	City Engr.
Rice Lake .....	.....	25	clay, gravel	.....	.....	.....
Sheboygan	50	10	clay, sand	15	\$5 (refunded)	City Engr.
Stevens Point..	enough	enough	sand	25	none	.....
Superior .....	.....	.....	red clay	20	none	City Engr.
Two Rivers	scarce	15	sandy	no monthly est.	none	City Engr.
Wausau	200 to 300	50	sandy loam	20	none	City Engr.
West Allis .....	.....	.....	clay	{ no estimate till accepted	none	City Engr.
Wyoming:						
Casper	scarce	75	{ sand, gravel, gumbo	15	\$10	.....
Cheyenne	30	10	sandy loam	15	\$5 to \$25	City Clerk
Canada:						
Brantford, Ont..	over 40	20	sand, gravel	20	\$1 per set	City Engr.
Calgary Alberta	.....	.....	gravel & clay	20	.....	.....
Charlottetown ..	50	10	clay & loam	.....	.....	.....
Galt, Ont.	none	none	clay, gravel, rock	20	none	City Engr.
Kitchener, Ont.	scarce	20 to 40	sand & clay	20	none	City Engr.
London, Ont. ...	.....	.....	sand, clay, gravel	25	none	City Engr.
Ottawa, Ont. ...	varies	.....	clay & sand	10	none	Comrs. of Works.
Regina, Sask. ...	800	200	heavy clay loam	20	\$10	City Engr.
St. John, N. B. ...	300	30	clay & gravel	20	\$1	Comr. Pub. Wks.
Sherbrooke, Que	.....	.....	.....	.....	\$25	City Engr.
Sydney, N. S. ...	20 to 30	10	firm clay	15	.....	City Engr.
Toronto, Ont. ...	580	105	{ clay, sand gravel, loam	15	none	Comr. Wks.
Victoria, B. C. ...	.....	.....	rock, clay, loam	.....	none	City Engr.
Winnipeg, Man. ...	.....	.....	clay	20%	none	City Engr.

* 35% may be retained if certificates are issued, otherwise only final estimate given. ‡ Plans and profiles not given out, can be seen at engineer's office. † None for local bidders. ‡ No payment until 60 days after completion of pavement. †† Also 7 or 8 motor trucks.

permanently soften the bituminous wearing surface and ruin it.

From an examination of the street made while this work was in progress, it appeared that there had been practically no loss of material in the fifteen years of wearing, but that the depressions were made by a sliding of the bituminous material on the foundation. If

the surplus bituminous material in the humps is all used for filling the holes, it would seem to follow that the pavement thus made over has practically the same uniform thickness as when first constructed. To have taken up the old asphaltic surface and relaid new surface would, it was estimated, have cost Watonsville about \$15,000, whereas the cost of the work described was about \$400. It is expected that the pavement will again get into the wavy condition described and require to be scarified and smoothed again at intervals, since the fault was apparently in the smoothness of the foundation, which has not been remedied. The expenditure of \$400 every year, however, would be more economical than that of \$15,000 for a new pavement.

Shelter for Traffic Police.

A portable concrete shelter is being used in Orange, N. J., for the traffic police, the money for purchasing the same having been contributed by a few citizens. The interior of the house is heated by means of an oil stove. Instructions are given by the police by means of a "Go—Stop" revolving vane signal projecting above the roof of the shelter house. This shelter is located at a corner that is exposed to an unusual degree to strong west winds from the mountains a short distance away.



Courtesy of the Newark Evening News.



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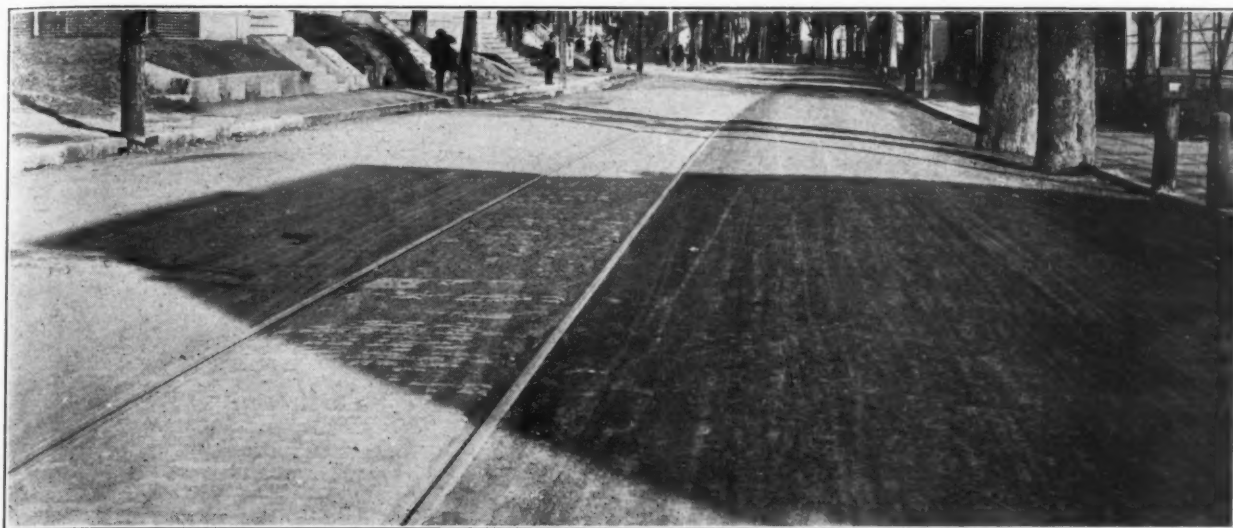
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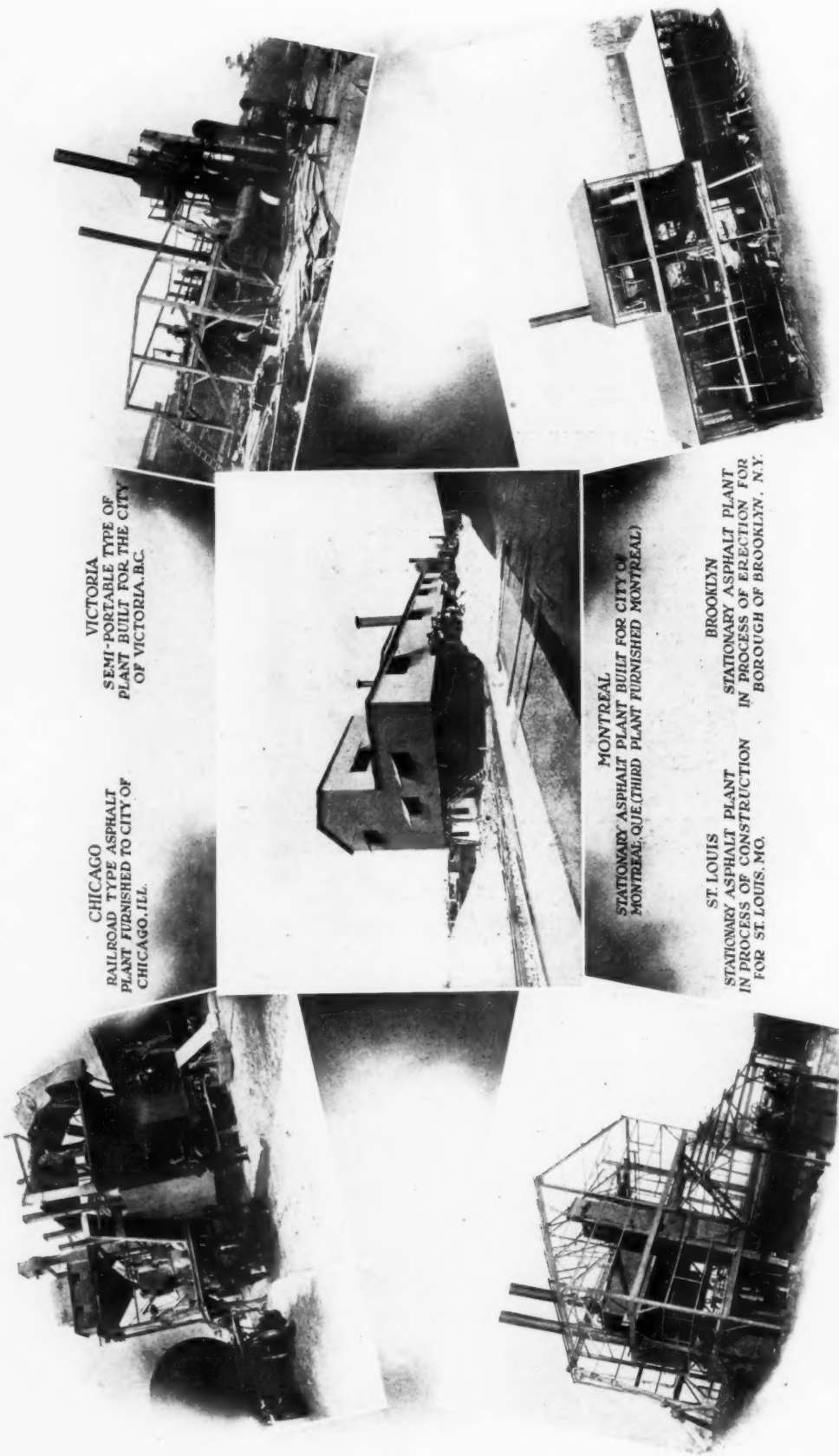
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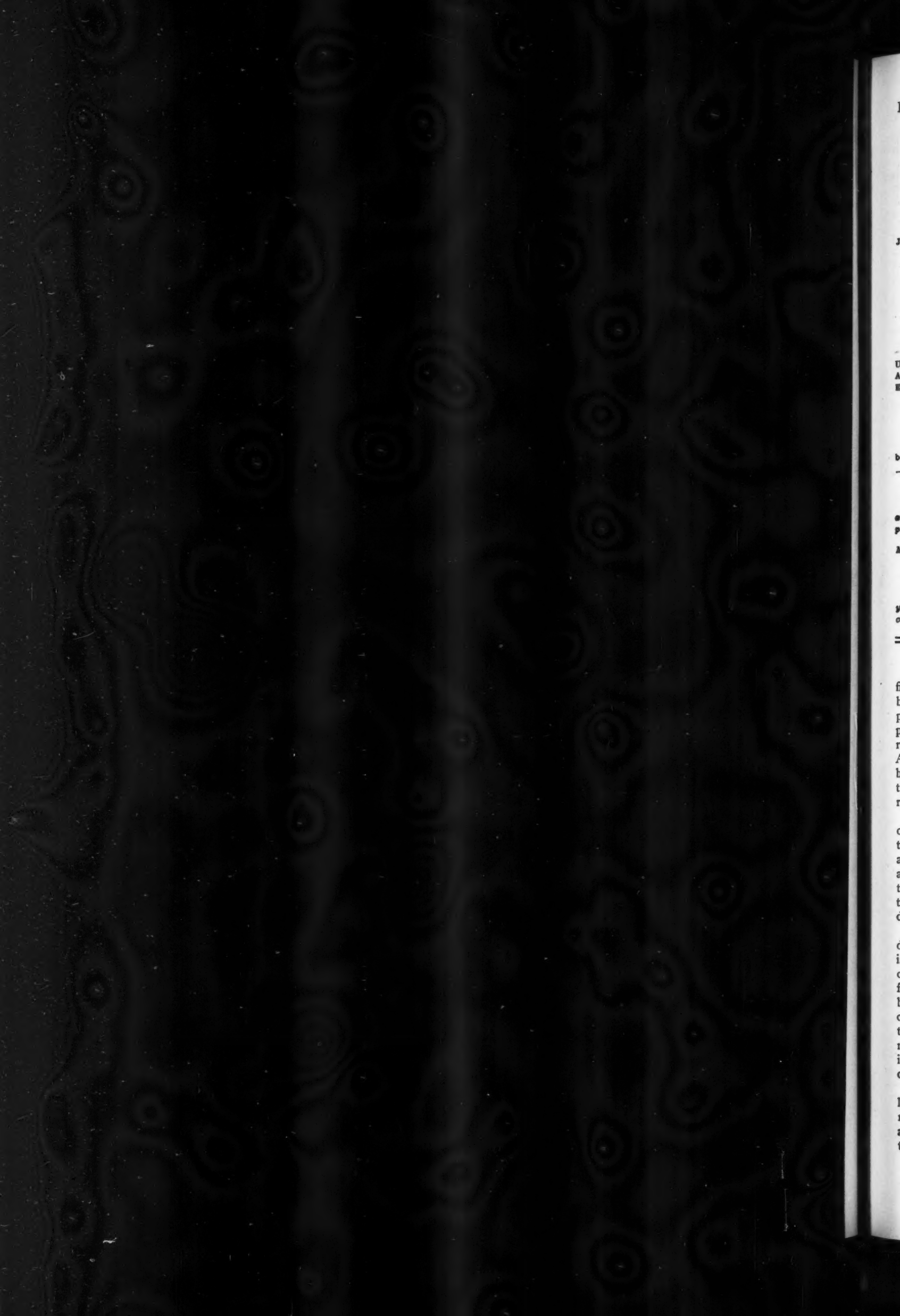
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Change of Address.

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

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Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

PAVING STATISTICS BY CITY ENGINEERS.

In the Spring of 1908 Municipal Journal published its first annual tabulated statistics of cities, about 450 cities being represented therein. These statistics have been published each year since then, the number of cities reporting increasing each time, until this year we have reports from nearly 1,200 cities and smaller municipalities. About 150 of these report no paving work done last year; but these negative reports are desired as well as the positive ones, since they add to the completeness of the record.

These tables have become the recognized authority on the kind and amount of paving done in the cities of the United States, and we believe their importance as a continuing history of paving is generally appreciated, as well as their value in showing the several cities how the amount of work that they are doing compares with that done by others, and the relative amounts of the different classes of pavement that are being laid each year.

The labor which the collecting and tabulating of these data place upon the editorial department of this paper is, as can be imagined, enormous. But we wish to give credit to the city engineers and other city officials who furnish the data at our request. The work performed by the hundreds of these who fill out our questionnaire cards totals even more than our own, and these statistical tables are therefore even more theirs than ours. We realize the trouble that the answering of our questions involves for them, but feel that the value to the profession of the information given justifies us in asking this of them.

City engineers, we are aware, especially those in the larger cities, receive numerous requests of this kind that make serious demands upon their time. Some of these are unnecessary duplications. During the past two or three years one or two of our contemporaries have paid

us the compliment of imitating our statistical service. This they of course have a perfect right to do—there is no copyright on the idea; but we regret that this results in the duplicating of questions and multiplying of demands on municipal officials just referred to. As none of the tables published by others have begun to compare with our own in completeness, it seems to us that no good purpose is secured by this duplication, and it is to be hoped that this imposition upon the generous willingness of city officials to serve will be discontinued.

It is because each shares his knowledge with the others of his profession that the great progress made by the technical professions during the past half-century has been possible. In this way each receives infinitely more than he gives, and any trouble involved in such giving is but a small price to pay for the benefit so received.

LOCAL DATA FOR CONTRACTORS.

A new departure will be found among the tables presented this week which we hope will be appreciated by contractors, as we believe it will be of value to them. Indirectly it should also be helpful to the cities, it appears to us, in that, by giving out-of-town contractors information concerning the local conditions of the various cities it will give them more inducement to bid upon work which such cities may have to let this year.

The information referred to gives, for each of seven or eight hundred cities, the kind of stone used by the city for concrete, macadam and similar purposes, and also the cost of such stone delivered in the city. Also the cost of sand such as the city engineers consider suitable for pavement work. The amount of unskilled labor available for contract work and the prevailing rate of wages for the same, and the same information concerning teams is given also. In addition, the nature of the soil at and near the surface is described. Other information includes the percentage of the monthly estimates that is retained from contractors for a stated period after the completion of the work; also from whom contractors can obtain plans and specifications of work about to be let and the charge, if any, which they will be required to pay or deposit on receiving them.

The above information has been furnished by the city engineers or, in some cases, other highway officials, and is therefore believed to be reliable and based upon information obtained from their experience in the course of actual paving work during the past. With this information, tabulated by states and cities so that it can be found readily and quickly, a contractor can tell in a moment many of the local conditions which will affect not only his price but also his decision whether or not to bid upon the work. For instance, he can learn whom to apply to for information concerning future contracts, whether unskilled labor can be obtained at the city in question or must be imported, and whether teams also can be found or must be brought in by the contractor, together with the prevailing price for each. Also the cost of the materials entering most abundantly into the paving work will be known. He will, of course, further investigate all of these points for himself before making a bid for any work, but it is hoped that the information given will be of great assistance in his preliminary consideration of the matter.

Two or three cities have, for a year or more, been making a practice of furnishing this information in connection with notices calling for bids, and we believe have found it to be to their advantage. If this is the case, it would seem probable that other cities would find it equally advantageous to have information of this nature readily obtainable by those who would be likely to bid upon work which they may have in prospect.

The WEEK'S NEWS

State Highways of Maine and Other New England States—The New Bridge of St. Louis—California's State Sanitary Bureau—Oskaloosa's New Sewerage System—The Wanaque Project—Ohio Water Supplies—Sudden End of Passaic's Gas Rate Case—Big Power Development for Chicago District—Conference Course for Policemen—New Auto Fire Apparatus—The Sandusky Situation—Milwaukee Mayor's Advisory Body—San Francisco Wins in Municipal Ownership Fight on Street Railways—Supreme Court Decides Against Billboards.

ROADS AND PAVEMENTS

New Highway Law for Maine.

Augusta, Me.—After over a year of investigations with the idea of ascertaining the future highway requirements of Maine as well as the necessary amendments to the present highway law, the Statewide Good Roads Committee of Maine, representing forty-eight different organizations and working in conjunction with the Maine State Grange, the Maine Automobile Association and the Maine State Board of Trade, has presented to the legislature the proposed new mill tax and general highway law which is to be introduced under the title of the Grange-statewide Highway Committee bill. The bill as presented embodies the ideas of a majority of the leading highway experts of Maine, among those who drafted it being Prof. George T. Files, Hon. John Clark Scates, C. S. Stetson, former Master of the State Grange; Charles F. Flagg, president of the Maine State Board of Trade, and others. It has the endorsement of the Maine Automobile Association, the Maine State Grange, the Maine State Board of Trade, and a majority of the other leading organizations of the state. The bill provides for a tax of one mill on the property of the state for the construction of state and state-aid highways. This will amount this year to \$521,000. Of this amount \$200,000 is to be added to the regular state-aid fund of \$300,000, making a total of \$500,000 for the construction of state-aid roads, the fund thereby being increased by two-thirds (and the towns are not required to make a greater appropriation than formerly in order to get the increased benefits) the balance of \$321,000 to be devoted to the construction of state roads. In addition to the \$321,000 for state roads there will be available this year from the federal government approximately \$135,000, also \$175,000, the last of the \$2,000,000 bond issue. For 1918 there will be received the same amount from the federal government; for 1919, \$180,000; and in 1920, \$225,000. Ultimately, with the federal aid, there will be about an even division for state aid and state

highways. No part of the mill tax fund can be used for the construction of roads on that portion of a street devoted exclusively to business, or on any street where the houses on each side of the street average less than 20 feet apart in towns or cities of over 2,500. Provision is made for better co-operation between the governor and council and the highway commission. Arrangement is provided for better detours around state-aid highway construction. Instead of \$60 per mile for maintenance on state roads provision is made for \$125 per mile, to be provided by the towns through which the highways run. The highway commission, with the approval of the governor and council, is given permission to construct sections of state roads or trunk lines without the formality of advertising for bids, if this course be not for the best interests of the state. Towns will receive from the state for state-aid roads one-third more than formerly, without any increase of the present appropriation from the towns themselves. The 1920 limit for towns wishing to adopt the "five-times clause" for state-aid roads is done away with. An equalization or special fund is created, not to exceed \$50,000 to assist towns having excessive highway burdens to eliminate especially bad sections on their principal roads not comprised in the system of state or state-aid highways. This fund is to be apportioned by the highway commission, with the approval of the governor and council.

Municipal Free Bridge Opened.

St. Louis, Mo.—Before one of the largest crowds ever gathered in the city, Mayor Kiel formally opened the new Municipal free bridge. A parade and speeches marked the celebration and the big masses of people from the Illinois side joined in the events. In the parade was an automobile truck laden with coal to symbolize the passing of the "arbitrary" of 20 cents a ton that for many years St. Louis has paid to the Terminal Association for its supplies of fuel from Illinois. While agitation for a municipal bridge was active in 1905, the first actual step toward its



Courtesy, St. Louis
(Mo.) Post-
Dispatch.

THE NEW
\$6,000,000 FREE
BRIDGE OF
ST. LOUIS.

construction was taken on June 12, 1906, when a bond issue for \$3,500,000 was passed authorizing its construction. On Nov. 22 an ordinance locating the bridge at Chouteau avenue was passed, but it was two years later when the plans were approved by the U. S. War Department. On Jan. 18, 1909, Boller and Hodge were appointed chief engineers of the bridge. Work of constructing piers began Dec. 20, 1909, and was completed June 17, 1911. A bond issue of \$2,750,000 for additional funds was defeated in 1911 and in 1912 it was again beaten. In 1913 the west approach was completed. On Nov. 6, 1914, the necessary bond issue was passed and work on the eastern approach and the bridge proper has been going on sporadically since then. The highway deck was completed Jan. 3 last, and the completion of the railroad deck and approaches is promised by next June. The Free Bridge is said to be the biggest of its type in the world and one of the largest of any type in North America. It is the largest spanning the Mississippi River. The two bond issues amounted to \$6,250,000. The cost of the main river spans was \$1,421,887.26; the piers cost \$468,923.73; the west highway and railroad approaches, \$623,289.43; the east approaches (estimated), \$2,404,936; land for west approaches, \$598,440.63; and the land for east approaches, \$177,344.90. The weight of steel used in main river spans was 27,851,332 pounds, and the weight of steel in approaches was 63,876,400 pounds. The length of the bridge, including highway approaches, is 9,797.96 feet; and including railroad approaches it is 18,258 feet long. The distance from top of bridge trusses to low-water mark is 219.82 feet; and from level of highway deck to low-water mark, 143.70 feet. The clearance over high-water mark is 65 feet. The length of middle span is 677 feet; the length of each shore span is 672 feet, and the total length of channel spans is 2,022 feet. The grades on the west highway approach vary from 1 to 3.44 per cent and on east highway approach range from .98 of a per cent to 4.15 per cent. The width of roadway on highway deck is 30 feet, with six-foot walks on each side.

Proposes Free Paving Brick for Counties.

Columbus, O.—Free paving brick for Ohio counties is the plan of penitentiary warden P. E. Thomas now before the legislature. The warden would erect a \$300,000 plant with a big iron detention fence at Athens, work about several hundred pen prisoners there and turn their daily output, 200,000 paving brick, over to Ohio counties free. Thomas says the state owns a site at Athens with these facilities for the plant: Enough shale and clay to run the plant fifty years; water power worth \$12,000 a year now going to waste; excellent railroad connections.

Township Highway Purchases Must Be Approved.

Springfield, Ill.—County highway commissioners throughout the state are interested in an opinion just handed down by attorney general Brundage in which he holds that contracts for all road and bridge construction and repair work costing more than \$200 must be submitted to the county superintendent for his official approval. A practice has grown up in some townships in the state, it is said, for commissioners to buy different articles for improvements separately, no one of which amounts to the specified \$200 named in the Tice road law.

New England Road Expenditures Increase.

Washington, D. C.—Expenditures for road improvements in the New England states in 1914 showed increases over such expenditures in 1904 ranging from 10 per cent in Rhode Island to nearly 205 per cent in Massachusetts, according to road statistics for the section, just published by the Office of Public Roads and Rural Engineering of the U. S. Department of Agriculture. The total for 1914 was \$15,435,766.01, and for 1904 \$7,383,755.70. Of the expenditures in 1914, Massachusetts spent more than \$6,000,000 and Connecticut over \$3,640,000. The approximate expenditures for the remaining states were: Maine, \$2,642,000; New Hampshire, \$1,590,000; Vermont, \$1,024,000, and Rhode Island, \$446,500. The surfaced roads of the six states had an aggregate length of 18,036.78 miles on January 1, 1915. This was 20.80 per cent of the total road mileage, which

was 86,718. While the percentage of improved roads is a trifle less than that given in the statistics gathered in 1909, this merely indicates, in the opinion of federal road specialists, that the present statistics are more nearly accurate and not that there has been any lack of growth in the road systems of the section. The statistics show that nearly 10 per cent of the improved roads in New England are bituminous macadam, 12 per cent macadam, 0.23 per cent concrete, and 0.01 per cent brick. Approximately 60 per cent of the improved highway is surfaced with gravel. Of the six states, Massachusetts had the greatest percentage of surfaced roads on January 1, 1915—45.53 per cent. Nearly 15 per cent of this surfaced mileage was bituminous macadam. This was approximately nine times the mileage of bituminous macadam in New Hampshire, the state having the next greatest of this type of road. Road and bridge bonds to the amount of \$20,565,522.82 were outstanding in the six New England states January 1, 1915. Of these, all but \$1,606,022.82 of town bonds in Massachusetts were state obligations. All the New England states now have highway departments and apply state funds to the aid of road improvement, the report shows.

SEWERAGE AND SANITATION

Work of State Sanitary Bureau.

Berkeley, Cal.—Since the opening of the state board of health bureau of sanitary engineering in October, 1915, more than 2,900 water samples have been received for examination and six sewage disposal plants have been investigated. The equipment, valued at \$1,000, is located in the civil engineering testing laboratory building of the college, and is under the charge of the chemist and bacteriologist, Frank Bachmann. The laboratory's principal item of investigation consists of water supplies of cities and small communities throughout the state. In this connection it performs the functions of furnishing information and advice and of seeing that state sanitary laws are enforced. The capacity of the laboratory with the present staff of four men is sufficient to test fifty water samples each day. While this figure has not yet been reached, the demand of the public for information has steadily increased. The maximum demand for a single week reached one hundred and ten and that for one month was more than four hundred.

Engineers Inspect New Sewerage System.

Oskaloosa, Ia.—E. B. Black of Kansas City, of the engineering firm of Black & Veatch, which made the plans and the special survey of the sewage disposal plant and sewer extension northeast of town, has made an examination of the work completed by the Kansas City Construction Company under the personal supervision of engineer E. R. Tibbets. Mr. Black, Mr. Tibbets, mayor J. G. Harrold and city engineer Horace Hawkins went over every part of the work. The Imhoff tank and the contact beds are in excellent condition. The plant has been in operation for some weeks and it is giving a satisfactory account of itself in every particular. Plans for this plant were submitted to the state board of health for approval and acceptance and the work will probably be inspected by state engineer Higgins. The job represents an outlay of over twenty thousand dollars.

To Turn River Into Sewer.

St. Louis, Mo.—The Board of Public Service has approved a definite plan for converting the River des Peres into a sewer. This plan is the culmination of surveys and estimates extending over a period of fifteen years, under successive administrations. The estimated cost is \$6,700,000, and a bond issue will be required to finance it. City officials will not attempt, at present, to have the legislation for a bond issue passed. From Macklind Avenue to the Mississippi River, an open channel, lined with concrete, would carry the stream. This would be, at its narrowest points, 90 feet wide at the top and 35 feet wide at the bottom, and at the approach to the Mississippi, 200 feet wide at the top and 150 at the bottom. The depth would be 16 to 18 feet. Of the \$6,700,000 estimated cost, which is based on before-the-war prices of materials, \$3,000,000 would be for the inclosed part of the sewer,

\$2,500,000 for the open part and the remainder for connections with existing sewers. Under the open part of the sewer, from Macklind Avenue to the river, a sanitary sewer is to run, for the purpose of keeping the contents of the upper stream fairly clean. The City Plan Commission has put forth a somewhat similar plan, which includes boulevards besides the open part of the stream. So provision for driveways is made in the plan just approved. Wesley W. Horner, advising engineer of the sewer division, worked out the details of the present plan.

WATER SUPPLY

To Meter Large Water Users.

Pittsburgh, Pa.—The city council, sitting as the finance committee, has adopted a resolution declaring that all water users who are assessed \$500 a year or more on a flat rate ought to be required to install meters. It was also decided to consider an ordinance directing an appraisal of the city's water system. The budget committee recently appropriated \$75,000 for this purpose, it being the idea that the entire method of charging for water be changed and that water be sold as a commodity. Superintendent Charles A. Finley, of the bureau of water, stated that out of 85,000 services in the city, 25,000 are metered, and that all hospitals, charitable institutions, bath houses, breweries and armories are metered. Most of the parochial and private schools are metered. Out of 113 public schools, six are not metered, and all of the saloons in the city have meters except 11. Nearly all of the tanneries are metered.

To Relieve Brooklyn Water Shortage.

New York, N. Y.—Brooklyn will be supplied with a continuous flow of Croton water until the Catskill aqueduct system is completed on April 1 or sooner by a plan designed to alleviate the situation in this borough arising out of the extraordinary drought, which, Commissioner Williams of the Department of Water Supply, Gas and Electricity says, is "the worst in ninety years." There is almost a water famine in Brooklyn and Queens and millions of gallons have been purchased daily from private water companies at costs ranging from \$40 to \$60 a million gallons. Commissioner Williams stated that for several days prior to January 6 the department sent 15,000,000 gallons a day of Croton water to Brooklyn—through the new aqueduct tunnel beneath the East River. Between January 6 and 18 the sending of Croton water to Brooklyn was discontinued. Now it has been resumed and from 30,000,000 to 40,000,000 gallons a day will be sent from the Jerome Park reservoir. That sent prior to January 6 had to be pumped by means of the high-pressure fire service pumps. That which will be sent from the Jerome Park reservoir will not require pumping. When the Catskill water is obtained, the supply will be adequate for at least seven years.

Newark Alone in the Wanaque Project.

Newark, N. J.—Newark will have to proceed alone in the preliminary steps toward the development of the Wanaque watershed. City officials accepted this as practically assured, after a hearing before the North Jersey District Water Supply Commission, at which representatives of other North Jersey cities and towns expressed varying degrees of interest, but no readiness to join in. The failure of any other city or town, Paterson included, to agree to join in the preliminary steps, means that Newark will have to pay the bills for the survey and data that must now be gathered by the Water Supply Commission. The commission's course will now be to prepare all plans, issue a formal prospectus, and then secure contracts with the various interested towns and cities. However, in the final assessment of cost, this city, attorneys at the hearing declared, will be credited with its preliminary disbursements when the total cost is apportioned pro rata. Speaking for Paterson, Mayor Amos H. Radcliffe, explained that his city will need 10,000,000 gallons a day at least; possibly 20,000,000 gallons by the time the watershed development is complete. However, the mayor said, Paterson does not yet own the water pipes in its streets, and its present plans are confined to putting through necessary court procedure

for the condemnation of the main system. Commissioner John H. McGuire, who, with city counsel Albert O. Miller, represented Passaic, declared that condemnation proceedings to enable the city to acquire its distribution system were now involved in certiorari proceedings brought by the system's present owner, the Acquackonk Water Company. Eventually, Mr. McGuire said, Passaic would own the main, and would then join the project.

Modification of two important conditions imposed by the State Department of Conservation and Development in granting permission for the Wanaque development has been requested by the North Jersey District Water Supply Commission. One of these relates to the minimum low flow that must be maintained and the other to the period in which the development must be begun and completed. In making the grant, December 19, the department ruled that the dry season flow of the Wanaque River below the dam to be constructed by the commission must at all times be maintained at a minimum of 12,000,000 gallons a day. Morris R. Sherrerd, the commission's engineer, told the members of the Water Board that this restriction would enable the Lehigh Valley Railroad, lessee of the Morris Canal, to refuse during the dry season to draw water from Greenwood Lake for the canal feeder, because the 12,000,000 gallons that would have to be supplied by the Water Commission would be enough to supply the canal feeder. The commission, the engineer held, should not be put in the position of having to furnish enough water from its reservoir to supply the canal feeder, although the commission should be willing to let down an amount of water equal to what would flow in the river when not supplemented by draft on the lake. As the state department ruled that actual construction of the reservoir must be begun within one year after the grant had been accepted by the commission and be completed within five years, it was decided to ask that this proviso be added to the requirement: "Unless action of the commission has been delayed beyond said period by reason of litigation or matters beyond its control."

Water Supplies in Ohio.

Columbus, O.—Eighty-seven per cent of the population of Ohio residing in incorporated communities, have access to filtered water or that secured from ground water sources. Ohio has made rapid progress in bettering its drinking water, according to W. H. Dittoe, chief engineer of the state board of health. The best proof, it is said, of the betterment of the water supply of the communities of the state is shown in the decrease of typhoid fever and the lowering of the death rate. In many cities, including Cleveland, Cincinnati, Columbus and Dayton, the disease is now a rarity, where once it was prevalent. Where it does appear its source is usually traced outside of the city. The board suggests that less important improvements be sacrificed to make way for this vital work. Under the Bense act the board has authority to make an order for pure water, but it has often preferred to let public sentiment demand the improvements.

Court Makes Four-Foot Gap in New Conduit.

Fort Worth, Tex.—Completion of the city's conduit line from the reservoir at Lake Worth to the city has been again delayed indefinitely, judge Terrell in the district court having granted the temporary injunction asked by W. J. Bailey to prevent the filling of the four-foot gap which alone stands in the way of its completion. City officials had expected to turn the water from the lake into the conduit within the next week, although it was to be primarily a test of the line, and waterworks superintendent Lord admitted on the witness stand that he did not know whether the old part of the line would hold water. City attorney Altman states that the present administration will not enter into a contract with Bailey or any one else for the sale of water for irrigation purposes. It was the refusal of the administration to ratify a verbal agreement alleged to have been made under the Davis administration, by which Bailey was to get water for irrigation purposes in return for giving the city a right-of-way for the conduit line across his land, which precipitated the injunction suit. It was admitted that there had been no condemnation of Bailey's land and judge

Terrell held that if the city, with no condemnation and no contract, sought to take any part of Bailey's land for the completion of the conduit without his consent, whether the amount involved were four feet or four miles, he was entitled to an injunction. Bailey's contention was that the old Hedges line, which crosses his land, was of such faulty construction, as proved by former tests, that his land would be flooded if the water were turned into it, and that the city did not have any funds with which to take care of the damage which would result. Bailey testified that on the first test the line lost between 400,000 and 500,000 gallons of water a day and said that the test flooded about five acres of cotton so thoroughly that it ruined the crop entirely. He declared there was no question that the pipe is cracked and that it leaks not only at the joints but in the pipe. Superintendent Lord said there were only two bad leaks, and that the others had stopped after the water ran through the pipe for a time. He expressed the belief that the silt carried by the water would help stop up the smaller leaks. He had planned to go into the pipe and repair it from the inside. He said the pipe had settled so badly where the worst leaks occurred that the flanges had broken off.

STREET LIGHTING AND POWER

Municipal Plant Cuts Light Rates.

Niles, O.—Municipal light rates will be reduced 20 per cent, according to an announcement by city officials. The new rate is 8 cents a kilowatt hour, with a 20 per cent discount for cash payment. The power scale ranges from 6 to 2 cents. The distributing plant here earned \$14,292 above all expenses last year.

Company Abandons 90-Cent Gas Fight.

Passaic, N. J.—The Public Service Gas Company has decided to make no further effort to restore the rate of \$1 per thousand cubic feet for gas, and as a consequence there will be no argument in the United States Supreme Court on what has come to be known as the "Ninety Cent Gas Case," an agreement having been reached for the dismissal of the company's appeal. A stipulation signed by counsel representing the company, the New Jersey State Board of Public Utilities and the cities of Passaic and Paterson, all of which were parties to the litigation, will be filed with the court, and the case will be stricken from the calendar. The case had attracted nation-wide attention. The 90-cent rate has been in effect pending the final adjudication of the case by the United States Supreme Court and so the latest developments mean that no further attempt to restore the dollar rates will be made. The decision keeps in force the rates now in existence here as to gas. The fight for lower gas rates was started in 1911 by George L. Record, who initiated the movement as special counsel for Passaic and Paterson. The question at issue was whether the gas company should be allowed to make rates based on values including those of franchises given the company by the people for which the company had paid nothing. The company held that the franchise values should figure in the computation of rates. This was the claim that Record fought vigorously all through. In explanation of the decision, president Thomas N. McCarter of the Public Service Gas Company stated that "when this order took effect it was extremely burdensome and the company was advised that the order was confiscatory of its property. The litigation in regard to the order, due to no fault on the part of the company, has been very protracted, four years having elapsed since the order was made by the commission. Latterly, due to the growth of the business and certain other features connected therewith, the burdensome features of the rate have been lessened and the company decided that, even if it won the case in the Supreme Court of the United States, it would not go back to the dollar rate for gas." George L. Record gave out this statement on the subject: "The withdrawal of the suit at this time constitutes a final victory for the people in this prolonged litigation. It is apparent that the company realizes that there is no hope of getting our

courts to allow the company to make rates based on so-called franchise values. The fight of the company was to obtain the sanction of the court for the millions of dollars water stock that the company had issued. The withdrawal of the suits ends finally this last attempt to get the approval of the court for earnings upon securities which represent no investment. It is in every way a great triumph for the people."

Agitation for lower gas in Passaic and Paterson began in 1910. Application was made to the Utility Board, which ordered an investigation. This terminated two years later in the order that the price in the Passaic district be set at 90 cents and a recommendation that the same price be put in force in other districts served by the company. The gas company, first obtaining an agreement that such action would not be held prejudicial of its interests in court, tentatively put the lower rate in effect in all its territory, and appealed to the New Jersey Supreme Court. When this court upheld the state board, appeal was taken to the Court of Errors and Appeals. The Court of Errors first overthrew the Supreme Court decision, voting 6 to 4. After a bitter fight, led by George L. Record, as special counsel for Passaic, the Court of Errors reopened the case and after a further hearing gave a decision, 6 to 4, for the Utility Board. The company then carried the case to the United States Supreme Court. Opinion is very rife throughout the state that a good additional reason for the dropping of the case is the fact that pending legislation is threatening increased franchise taxes. An additional statement made by George L. Record was: "The allowance of \$1,025,000 'going value' by the Utility Board and which was included in the property of the company on which the 90-cent rate was based, is entirely illegal and I don't believe the existing commission (State Board of Public Utility Commissioners) would allow it. I believe it is possible to get a much lower rate, probably 70 cents. If the \$1,025,000 for 'going concern' were refused the rate would immediately be cut about 10 cents, or to 80 cents. The physical value allowed by the Utility Board in determining the 90-cent rate, in my opinion, was very greatly excessive."

Propose Big Power Development.

Chicago, Ill.—Special legislation in the general assembly that will permit the sanitary district of Chicago to develop water power privileges in the vicinity of Joliet has been planned. The proposed power plant will be located at Brandon's Road, south of Joliet, where a maximum of 28,000 horse power is possible. The cost of the plant would be \$5,000,000. The attractive argument for Chicago is found in the statement that as a result of this development the city of Chicago could practically double its street lighting facilities and receive free current for lighting. This would be done, according to representatives of the sanitary district, by selling the current to consumers during the day and furnishing it free for the municipality at night. In developing these plans for the proposed power plant the trustees of the sanitary district had the services of Gardner S. Williams of Ann Arbor, Mich., as consulting hydraulic engineer. One of the elements of cost at this time is the fact that the project, if built now, must be based on "war prices," which will swell the total materially. The most favored of the plans calls for an investment of approximately \$6,000,000, \$4,900,000 being for the plant proper and its contingent expenses, and \$1,100,000 for the transmission system. The plan is that the district will sell the current from both the present Lockport plant and the one to be developed below Joliet at a cost sufficiently remunerative to pay for operating both plants day and night. The output last year at the Lockport plant, according to figures given out, was 100,000,000 kilowatt hours, all of which under the plan would be turned over to Chicago. The output at the Brandon's Road plant will be approximately the same. Selling this current for one and three-quarters of a cent per kilowatt would yield \$1,750,000. By charging up the cost of operating the two plants, \$703,000 for Lockport and \$557,000 for Brandon's Road, and adding 10 per cent, or \$126,000, for safety, engineer Williams shows a surplus of \$264,000 for the year,

in addition to giving the city of Chicago more lights than at present and furnishing the current without cost. As an inducement for state action, the engineer points out that there will be a stretch of waterway through Joilet five miles long and ten feet deep, worth between \$3,000,000 and \$3,500,000 to the state, and furnishing a valuable link in the deep waterways facilities.

FIRE AND POLICE

Conferences on Police Administration and Practice.

Cambridge, Mass.—At the request of Mayor Rockwood, a series of conferences on police administration and police practice were held by arrangement with Harvard University for members of the Cambridge police department. Five conferences on the general principles and problems of administration in Europe and America were given by Raymond B. Fosdick, lecturer in the New York City police school for recruits. Four conferences on methods and practice were given by inspector Cornelius F. Cahalane, of the New York department. The former series were for commanding officers, captains, lieutenants and sergeants, and two of the latter were also for patrolmen, while one in each series was also for detectives. The conferences were held at police headquarters and those open to patrolmen were given twice, so that each platoon could attend. Officers from the departments of other cities were in attendance. Mr. Fosdick's conferences were: "Police Work in Europe and America," "Organization of the Police Department," "Training of Policemen," "The Uniformed Force" and "Newer Methods in the Detection of Criminals." Inspector Cahalane's conferences were: "Methods of Patrol," "Duties of the Man on Post," "The Management of a Station House" and "Thieves." Most of the conferences lasted two hours and the topics were thoroughly treated.

Fire Station Burned While Hose Is Thawed.

Fosston, Minn.—During a fire which destroyed a theater building here, the fire hose froze. Firemen thawing out the hose in the city hall left a stove door open and a second fire resulted. Practically without apparatus the firemen were unable to subdue the flames until the city hall and fire station and two other buildings had been destroyed. The loss was estimated at \$50,000.

The "Diet Squad."

New York, N. Y.—The twelve police rookies who for three weeks have been the subjects of diet experiments to demonstrate that 25 cents a day is adequate for good and sufficient food for one person have completed the tests. All the men are in good health and declare the meals have been excellent. Eleven gained a total of 29½ pounds and one's weight was the same. During the experiment a number of city officials were guests at the seven or ten-cent meals and music and dancing enlivened the occasions.

Assistant Chief Killed in Theater Fire.

Seattle, Wash.—Assistant fire chief Fred Gillam was killed and eight men were injured in a fire which destroyed the old Grand opera house. The alarm was turned in at 6.15 a. m. At that time the interior of the theater was burning fiercely. The firemen entered the building with hose and the roof crashed down, burying them. Assistant chief Gillam was taken from the flames with both feet charred and his body badly crushed and burned. He died on the way to a hospital. The fire started on the top floor of the theater, a four-story brick structure with a fifth story built as a sloping roof. Adjoining buildings, including a hotel, were saved by the work of the men.

Two Platoon System for Battalion Chiefs.

Buffalo, N. Y.—That the battalion chiefs of the fire department are entitled to the benefits of the two-platoon system, the same as "the uniformed" force, is the conclusion which corporation counsel William S. Rann has reached after studying the ordinances adopted by the council last March providing for putting into effect the two-platoon system in the fire department on July 1. When the system went into effect only the "uniformed" force benefited by it. These firemen have two shifts, a day shift of ten hours

and a night shift of fourteen hours. They change about every two weeks. Some time ago the battalion chiefs, led by John P. Morrissey, filed a petition with the council asking to be included in the two-platoon system. Battalion chiefs are now working 24 hours a day. They are paid \$2,200 a year. If the council decides to allow the chiefs the benefit of the new system it will mean that eleven new chiefs must be appointed. They will be paid the same salaries as the others. This would result in an addition of \$24,200 to the payroll of the fire department. Mr. Rann called the attention of the council to the fact that there is a bill in the assembly which has been referred to the committee on affairs of cities providing for the institution of the two-platoon system in all the first class cities of the state. The fire departments in first class cities would thus be put on two shifts similar to the scheme in effect in Buffalo.

Fight Fire in Sub-Cellar.

New York, N. Y.—In the smoke-filled sub-cellar of an old five-story office building, forty feet below the street, relays of firemen fought a blaze for several hours. Three alarms were turned in before enough apparatus and men were assembled to put out the fire. The damage was \$20,000. The burned sub-cellar was used as a storeroom by a lunch company and it had evidently been burning for some time when discovered. After the walls had been chopped through on several floors the fire was traced to the sub-cellar, which by this time had filled with smoke. Acting battalion chief John Kelly was overcome by smoke and fell down a small spiral stairway. Luke Henry, chief Kenlon's chauffeur, who was immediately behind, stumbled over him, but was able to carry Kelly to the street.

MOTOR VEHICLES

New Truck in Service.

Galesburg, Ill.—Galesburg's first piece of motor equipment has arrived in the city and has been put into service. The car is the latest type of American-La France apparatus. It is equipped with a 110 horse power motor. Fifteen hundred feet of hose can be carried in the rear part of the car. The junior pump has a capacity of 350 gallons of water per minute. Electric lamps, searchlight, one 20-foot extension ladder and one 12-foot roof ladder with folding hooks, two 3-gallon Babcock fire extinguishers are included in the very complete equipment. The car will carry seven men.

Install New Apparatus.

Jacksonville, Fla.—Four new motor fire trucks, purchased from the American-La France Company, have just been placed in the service of the local fire department. The new apparatus consists of triple combination trucks and a hook and ladder truck. The combination motors are equipped with high pressure pumps and carry hose lines and chemicals. These combination automobile trucks were thoroughly tested and fire chief T. W. Haney is much pleased with them.

New Hook and Ladder.

Bradford, Pa.—Bradford's fire fighting equipment now contains but one horse-driven apparatus, the new motor-driven Seagrave hook and ladder truck having been tested and installed. The latest addition is a handsome, compact and serviceable vehicle, rated at 80 horse power, but capable of developing 120 horse power. It is 40 feet over all and is supplied with a 55-foot extension ladder, a 40-foot extension ladder, a 30-foot Seagrave wall ladder, one 24-foot wall ladder, a 20-foot wall ladder, a 16-foot roof ladder, a 12-foot roof ladder and a 16-foot extension ladder. A feature of the equipment is a life net ten feet in diameter with thirty coiled springs. The new truck accommodates about 30 men. At the rear of the driver's seat and beneath the car, between the front and rear wheels, and at the rear of the latter, are three baskets for carrying tools, small hose, extra clothing for firemen and other essentials. The truck carries a complete outfit of fire fighting implements. The new truck replaces a horse-drawn Seagrave truck which was placed in commission August, 1894, and which in turn supplanted the city's original hand-drawn truck which had seen sixteen years of active service.

GOVERNMENT AND FINANCE

Mayor Chosen by Lot After Deadlock.

Sandusky, O.—After a deadlock of several weeks, the city commissioners have finally chosen one of their number president of the commission and mayor. The situation really began immediately after the commission came into office and organized into two opposing factors of two each, with the mayor a neutral. At the beginning of the year the company bonding mayor Koegle refused to renew the bond because the mayor is under charges of having illegally handled funds received by him as judge. Koegle acted as de facto mayor for a few days, but could get no company to bond him and he was deposed. The two opposing factions could do no business, but they finally decided on the choice of a new commissioner, Edgar Robinson. When it came to the choice of mayor, the deadlock continued, as commissioner Robinson refused to vote. The commission meeting at which the balloting occurred was attended by a crowd of about two hundred citizens, who continually shouted to the commissioners to choose someone and go about their business. One man from each side was finally nominated and their names written on pieces of paper and placed into a hat. Commissioner Robinson then drew and picked the name of commissioner Mitchell—and he voted for him. Commissioners Stubig, Reinhart and Graefe form the rest of the commission.

Earnings of Municipal Plants.

Palo Alto, Cal.—The annual report of the city of Palo Alto for the fiscal year ending June 30 has just been announced. The total revenue received by the city from various sources was \$96,498.49 and the total expenditures were \$87,679.30. This left excess revenue for the year of \$8,819.19, which added to the amount on hand gives the treasury a balance of \$20,216.12. The receipts for the water plant were \$30,320.16 and the expenditures \$22,568.23, leaving a net profit of \$7,751.93. The receipts from the power plant were \$54,561.17 and expenditures \$39,748.90, leaving a net profit of \$14,812.27. The receipts of the garbage destructor plant were \$6,970.89 and the expenditures \$7,795.52, showing a net loss of \$824.63. The balance sheet shows the assets of the city to be \$415,416.54 and the liabilities \$250,825.94, the surplus being \$200,825.60. This surplus is the value of the property owned by the city.

Work of Mayor's Advisory Body.

Milwaukee, Wis.—In the early part of last year Mayor Daniel W. Hoan invited various civic societies and organizations to select representatives to act on a committee in an advisory capacity to the mayor, such committee to investigate various subjects of public and city-wide interest which may from time to time engage the attention of the citizens of Milwaukee and which may call for governmental action. Such action by the mayor resulted in the formation and organization of a body of thirty-one men, representing as many civic and professional organizations. Each member makes a special effort to familiarize himself with the subject for discussion, then takes up the question with the organization which he represents before reporting back to the advisory board. In this manner the mayor receives the benefit of the combined efforts and knowledge of thirty-one organizations consisting of a great portion of Milwaukee's citizens. During the past year (the advisory board was first organized on June 3d, 1916), the board has gone on record on the following matters and recommended, among other things, that the mayor request the public land commission to make a complete city plan of the city of Milwaukee and favoring the employment of a paid secretary by such commission, and that the mayor request the same commission and the city attorney to advise what legislation is necessary that would assist the commission in carrying on its work, so that the advisory board could take the necessary steps to have such legislation enacted. The board recommended that the mayor veto the \$75,000 bond issue for the McKinley bathing beach, which issue was vetoed and subsequently sustained by the council; and that he use his good office to have a

member of the city planning commission serve on the lake shore commission, the work of the two bodies being similar. The board has appointed committees to investigate and the board has under advisement the following matters: City planning, city beautifying, legislation, park lighting, river and harbor improvements, street paving, traffic regulation, salary revision. The officers of the board are: Fred S. Hunt, president and chairman; Peter Brust, vice president, and Philip Grossman, secretary.

TRAFFIC AND TRANSPORTATION

No Licenses for Jitneys.

Bridgeport, Conn.—In consequence of a recent decision of the Supreme Court of Errors of Connecticut, holding that it is unconstitutional for municipalities or townships to exact a fee from jitney drivers, many jitney men are driving about Bridgeport without licenses. When it becomes time for their cards to be renewed next October, it is predicted that not one permit will be requested, and the drivers will go about the city without licenses, unhindered by the police. Under the decision of the Court of Errors the only rules governing jitneys that a municipality may make are the ordinances regulating the traffic, which may be especially adapted to care for the jitneys. The decision was handed down in a test case on a Stamford jitney ordinance, and declares it unconstitutional for anyone except the state to collect a fee from jitney drivers. As a result new drivers are not getting city licenses, and there will be no renewals. In the meantime the police are allowing the men to operate their cars without permits. The drivers are careful to live up to those ordinances which have been held legal by the courts. There are estimated to be more than 300 jitneys in the city and approximately 700 drivers. The city charges a \$10 license fee for each car and \$1 for the driver license and badge. This totals approximately \$3,800 a year. When the jitney owners and drivers take advantage of the new ruling this addition to the city treasury will be cut off.

Municipal Railway May Parallel Private Lines.

San Francisco, Cal.—The city of San Francisco won the first skirmish in the battle with the United Railroads over whether or not municipal street car lines shall be constructed on Market street parallel to the tracks of the United Railroads when an opinion was handed down by federal judge Hunt, holding that the city had the right to construct such lines. Judge Hunt denied the application of the United Railroads for a permanent injunction enjoining the municipal officials from carrying out their plans for the municipal lines and dismissed the complaint filed last June by the United Railroads. The contemplated municipal lines are to extend out Market street from Kearny to the eastern portal of Twin Peaks tunnel. Jesse W. Lilienthal, president of the United Railroads, definitely announced that an immediate appeal would be taken to the United States Supreme Court. The court held the city did not relinquish its right to establish street railways of its own when franchises were granted to the predecessors of the United Railroads. In his opinion judge Hunt said the construction of municipal street car lines comes under the doctrine that the police power may be extended to all great public needs. He holds the clause in the United Railroads franchise excluding competitors from laying rails parallel to those of the United Railroads for more than five blocks does not apply to the municipality. He said the city had the authority to construct tracks parallel to the United Railroads' tracks for any number of blocks. As to the plenary power of a municipal government to construct municipal lines, judge Hunt said: "Questions of traffic and of the increase of danger consequent upon increasing the number of tracks and street cars in a street being ordinarily matters for legislative rather than judicial control, the necessity for action by city authorities concerning transportation facilities is to be solved by the exercise of the judgment of municipal authorities proceeding within the limits of their general authority." The contention of the United Railroads that property would be taken from them without due process of law, in violation of the constitutions of the

United States and the state of California, judge Hunt brushes aside by saying no property is to be taken. He holds the traction company will be subjected to the inconvenience of municipal cars running alongside the corporation's car, but that such inconvenience cannot be construed as deprivation of property. Judge Hunt holds the United Railroads will not be entitled to any compensation for the crossings that the city plans to make over United Railroads' lines coming into Market street from intersecting streets. He says the city has the authority to cut the United Railroads rails wherever necessary. The suit decided was filed June 12, 1916, in the United States District Court. Judge Hunt sat for judge Van Fleet in the case. A preliminary injunction restrained the municipal officials from proceeding with the construction of the upper Market street extension of the Municipal Railway system, which had been begun on the day the suit was filed by president Reardon of the Board of Public Works striking a blow on a wedge for the excavation for a crossing at Van Ness avenue and Market street. Convinced that Judge Hunt's decision will be upheld in the event of an appeal to the Supreme Court of the United States, city authorities already are planning the construction of parallel tracks on upper Market street to complete the Twin Peaks tunnel and Church street line connections with the downtown districts, although no construction work can be legally undertaken.

City Demands Street Railway.

Omaha, Neb.—The city council has adopted a resolution, prepared by corporation counsel Lambert, claiming ownership of most of the tracks and property of the Omaha and Council Bluffs Street Railway company, on February 19 of this year. The claim is based on an act of the legislature of February 18, 1867, when a fifty-year grant was given to the Omaha Horse Railway company, with this stipulation: "Provided, That at the end of fifty years the said road, depots and other equipment shall revert to the city of Omaha." The corporation counsel admits his inability to define exactly just what property of the present system would rightfully and legally come within the city's claim of reversion. The effect of this resolution is that the city will make a formal demand upon the company to "surrender its interests, rights and property by virtue of and to the extent of the direction and requirements of the provisions of the territorial act." Failure of the company to accede to the demands of the city will result in a penalty of \$300 a day for each day on and after February 19. The corporation counsel outlined to the council the difficulties which lie in the way of the city defining just what is meant by a "real and substantial interest in and to all parts of the street railway system, depots, equipment and rolling stock of the Omaha and Council Bluffs Street Railway company." The council took the position that the franchise of the Omaha Horse Railway company expired on Monday of this week; that by reason of the consolidation the present company has been operating most of its lines and making many extensions upon the rights conferred by the old horse railway grant. The company will claim that there no longer exists any property of the old horse railway, all the tracks having been torn up and the whole system electrified, the identity of the company itself having been lost in a number of financial and corporate deals. If the company should refuse to comply, the city will proceed with court action.

MISCELLANEOUS

Win Fight Against Billboards.

Chicago, Ill.—After litigation dragging on for six years, the United States Supreme Court has upheld the validity of billboard regulation. It is within the power of a municipality, according to the ordinance upheld, not only to prohibit billboards that affect the city's fire, wind or health hazard, but also to abolish billboards entirely in residence sections by consent of the property owners. There has been a petition on file before the Chicago common council for some time for the tearing down of all billboards in residential sections of the city, and the promise was made

LEGAL NOTES

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Ordinance—Validity—Wisdom of Enacting.

(Wis.) In reviewing the validity of a municipal ordinance the courts are not concerned with the wisdom of the policy shown in enacting it.—City of Milwaukee v. Rauf, 159 N. W.

Police Power—Keeping Chickens.

(Ark.) Under Kirby's Dig. § 5438, empowering cities and towns to cause any nuisance to be abated, ordinance declaring the running at large of fowl within the city limits a nuisance, and the owner to be guilty of a misdemeanor, held valid.—Merrill v. City of Van Buren, 188 S. W. 537.

Business Regulation by Police Power.

(U. S. D. C.) A municipal corporation may, in the exercise of the police power, regulate any business in any respect in which it involves the public safety or welfare, but not beyond a point reasonably necessary for their protection.—Yee Gee v. City and County of San Francisco, 235 F. 757.

Nuisance—Definition by Municipality.

(Ark.) A municipal corporation cannot declare that to be a nuisance which is not such per se, though a large discretion rests with them in their determination of such question.—Merrill v. City of Van Buren, 188 S. W. 537.

Termination of Contract—Bidding Not Required.

(N. J. Sup.) Upon termination of garbage removal contract because of city's dissatisfaction with performance, competitive bidding held not required as to a contract made with another to complete the work for the unexpired term; the latter being but a subcontract.—Moriarty v. Board of Com'rs of City of Orange, 98 A. 465.

Public Water Supply—Contract.

(Me.) A city authorized by its charter to contract for public water supply could adopt a contract provisionally made with the promoters of the water company.—City of Belfast v. Belfast Water Co., 98 A. 738.

that the request would be granted in case the decision in the court at Washington was favorable. Chicago's city plan commission is gratified with the outcome, and so are a good many other people, who see in the decision a long advance in the city-beautiful idea. Efforts to obliterate the billboards have already been started, following the decision of the United States Supreme Court against the Thomas Cusack company. The ruling that frontage consent of property owners in the block where the billboard is to be raised must first be obtained affect only 250 to 300 billboards now existing, but the provision in the billboard ordinance giving the police and building commissioner power to order down any structure affecting the city's fire, wind or health hazards will be utilized most by the City Club officials who are leading the fight.

Park Commissioner Urges Street Tree Planting.

New York, N. Y.—Park commissioner Cabot Ward has issued an appeal to New Yorkers to let him be the gardener for the whole city. Commissioner Ward says that in Manhattan there are only 15,000 trees, and they are disappearing five times as fast as they are being replaced. The commissioner recommended a system of block units by which all the residents in a block should unite to plant trees on it. The following trees are recommended for New York streets: Oriental sycamore, Norway maple, red oak, ginkgo, European linden, Scotch elm, pin oak, Carolina poplar and ailanthus. Following is some advice the park department gives: "Early spring and fall are the two periods when planting can be done successfully. It is important, however, to start preparations in advance. Do not wait until the best trees are sold out, but order your trees at once." The commissioner gives detailed specifications of the manner in which the trees should be planted.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Jan. 31-Feb. 2.—OHIO ENGINEERING SOCIETY. Annual meeting, Ohio State University, Columbus, O. Secretary, John Laylin, Norwalk, O.

Feb. 6-7.—NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION. Annual convention, New York City.

Feb. 5-9.—AMERICAN ROAD BUILDERS' ASSOCIATION. Seventh American Good Roads Congress and Eighth National Good Roads Show, Mechanics' Hall, Boston, Mass. Secretary, E. L. Powers, 150 Nassau street, New York.

Feb. 7-9.—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Midwinter convention, New York City. Secretary, F. J. Hutchinson, 33 West 39th St., New York City.

Feb. 7-9.—MINNESOTA SURVEYORS' AND ENGINEERS' SOCIETY. Annual meeting, Minneapolis, Minn.

Feb. 7-15.—TENTH CHICAGO CEMENT SHOW, Coliseum, Chicago, Ill. Secretary, Blaine S. Smith, 210 South La Salle Street, Chicago.

Feb. 8-10.—AMERICAN ASSOCIATION OF ENGINEERS. National convention, Hotel La Salle, Chicago, Ill. Headquarters, 29 La Salle Street, Chicago.

Feb. 8-10.—AMERICAN CONCRETE INSTITUTE, Hotel La Salle, Chicago, Ill. Secretary, Harold D. Hynds, 1418 Walnut Street, Philadelphia, Pa.

Feb. 9.—TEXAS TOWN AND CITY PLANNING ASSOCIATION. Semi-annual convention, Sherman, Tex. Secretary, J. E. Suratt, Secretary Chamber of Commerce, Sherman.

Feb. 12-14.—AMERICAN CONCRETE PIPE ASSOCIATION. Annual convention, Chicago, Ill. Secretary, E. S. Hanson, 533 South Clark Street, Chicago, Ill.

Feb. 15-16.—WISCONSIN ENGINEERING SOCIETY. Annual meeting, Madison, Wis. Secretary, L. S. Smith, 939 University Ave., Madison.

Feb. 19-24.—SOUTHWESTERN CONCRETE ASSOCIATION. Annual meeting and concrete show, Convention Hall, Kansas City, Mo. Chairman, Show Committee, Chas. A. Stevenson, 1433 West 10th Street, Kansas City, Mo.

April 17-19.—TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA. Seventh annual convention, Macon, Ga. Secretary-treasurer, W. F. Stieglitz, Columbia, S. C.

April 18-22.—NATIONAL CONFERENCE ON COMMUNITY CENTERS. Annual conference, Chicago, Ill. Secretary, John Collier, 70 Fifth Ave., New York.

May 8-10.—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting, Washington, D. C. Secretary-treasurer, Franklin H. Wentworth, 87 Milk Street, Boston, Mass.

June 11.—NEW YORK STATE CONFERENCE OF MAYORS AND OTHER CITY OFFICIALS. Annual conference, Buffalo, N. Y. Secretary, W. P. Capes, 25 Washington Ave., Albany, N. Y.

Nov. 12-16.—AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, 469 Transportation Building, Chicago, Ill.

American Concrete Institute.

The preliminary program of the thirteenth annual concrete institute, which will be held at the Hotel La Salle, Chicago, February 8, 9 and 10, is as follows:

Thursday, February 8, 10 a. m.—Opening of convention. Leonard C. Wason, president.

"Slag and Cinders as Aggregates," Sanford E. Thompson, consulting engineer, Boston, Mass.

"Cost Accounting and Organization," Leslie H. Allen, Aberthaw Construction Company, Boston, Mass. Discussion by Frank R. Walker, Chicago, Ill. "Relations between Engineer and Contractor," C. A. Crane, secretary, General Contractors' Association, New York City.

"Method and Cost of Placing Concrete by Spouting, Industrial Cars, Buggies and Wheelbarrows."

"Concrete Columns with Cast Iron Core," L. J. Mensch, contracting engineer, Chicago, Ill.

"Building Codes for Small Towns," Ernest McCullough, consulting engineer, Chicago, Ill.

Luncheon and round-table talk, 1.15-2.45. In charge of H. C. Turner, vice-president.

8 P. M.—Report of Committee on Reinforced Concrete and Building Laws, Chairman E. J. Moore, chief engineer, Turner Construction Co., New York.

"Recent Tendencies in Industrial Building Construction," William P. Anderson, president, Ferro Concrete Construction Co., Cincinnati, Ohio.

"Results of Long Time Tests of Flat Slab Floor," Arthur R. Lord, consulting engineer, Chicago, Ill.

"Flow of Concrete," Office Public Roads and Rural Engineering, Washington, D. C.

"Tests on Thin Flat Dome of Concrete Tile," Prof. Willis A. Slater, University of Illinois.

"Ornamental Treatment of Concrete on New York Elevated," S. J. Vickers, Public Service Commission.

"Unit Construction," John E. Canzelman, civil engineer, St. Louis, Mo.

Friday, 10 A. M.—Report of Committee on Reinforced Concrete Standpipe, chairman, George A. Sampson, of Weston & Sampson, consulting engineers, Boston, Mass.

"Concrete Piles, Plain and Reinforced," Charles R. Gow, consulting engineer, Boston, Mass.

Report of Committee on Sewers, Plain and Reinforced, chairman, Wesley W. Horner, engineer of design, Board of Public Service, St. Louis, Mo.

"Reconstruction and Diversion of Sewers under New York Subway," S. D. Bleich, assistant division engineer, Public Service Commission, New York City.

"Effect of Hydrated Lime on the Strength, Absorption and Expansion of Concrete," Prof. H. H. Scofield, Purdue University. Discussion by W. E. Emley and N. G. Hough.

"A Course of Instruction in Reinforced concrete," Prof. William K. Hatt, Purdue University.

"The Relation of Reinforced Concrete to Vibration in Structures," Morton C. Tuttle, secretary, Aberthaw Construction Company, Boston, Mass.

Luncheon and round-table talks, 1.15-2.45. In charge of H. C. Turner, vice-president.

8 P. M.—Report of Committee on Concrete Roads and Paving, chairman, A. N. Johnson, consulting engineer, Chicago, Ill. Discussion by Prof. William K. Hatt, vice-president.

"Friction of Concrete Slabs on Different Supporting Materials," Office of Public Roads and Rural Engineering, Washington, D. C.

"Essentials for the Successful Construction of Concrete Highway," William M. Acheson, division engineer, State Highway Department, Syracuse, N. Y.

"Condition of the Wayne County Roads," A. N. Johnson, consulting engineer, Chicago, Ill.

"Experience in Construction and Maintenance of Concrete Highways in California," Austin B. Fletcher, highway engineer, Sacramento, Cal.

"Maintenance of Concrete Roads in Connecticut," Charles J. Bennett, state highway commissioner, Hartford, Conn.

"Some Recent Developments in the Construction of Concrete Roads," William M. Kinney, engineer, promotion bureau, Universal Portland Cement Co., Chicago, Ill.

Saturday, 10 A. M.—Business meeting.

"Artistic Stucco," John B. Orr, contractor, Miami, Fla.

Report of Committee on Building Block and Cement Products, Robert F. Havlik, chairman, Mooseheart, Ill.

"Ornamental Products," A. G. Higgins, manager, Trusswall Manufacturing Co., Kansas City, Mo.

"Concrete Roofing Tile," A. P. Tarnin.

"The Essentials of Concrete Products Manufacture," Davis Ewing.

"Concrete Silo Staves, Manufacture and Problems in Marketing," Portland Cement Association.

2 P. M.—"Effect and Width of Slab on Effective Width for Design," Office of Public Roads and Rural Engineering, Washington, D. C.

"Lessons from Culvert and Bridge Failures," Thomas H. MacDonald, highway engineer, Ames, Iowa.

Report of Committee on Reinforced Concrete Highway Bridges and Culverts, chairman, Prof. C. B. McCullough, Corvallis, Ore.

Report of Committee on Concrete Aggregates, chairman, S. E. Thompson, consulting engineer, Boston, Mass.

Report of Committee on Reinforced Concrete Chimneys, chairman, Harrison W. Latta, of Latta & Roberts, engineers and contractors, Philadelphia, Pa.

Report of Committee on Sidewalks and Floors, chairman, J. E. Freeman, engineer, technical division, Portland Cement Association, Chicago, Ill.

Report of Committee on Nomenclature, chairman, Prof. A. B. McDaniel, Schenectady, N. Y.

Report of Committee on Fireproofing, chairman, John S. Sowell, vice-president and general manager of Alabama Marble Co., Gantts Quarry, Ala.

Indiana Highway Association.

After completing a final draft of a proposed bill creating a state highway department, for introduction in the state legislature, seventy representatives of the Indiana state organization's highway committee, at a meeting held January 9 at Indianapolis, formed a permanent organization to watch the progress of the highway department legislation through the session.

L. H. Wright of Columbus, president of the Indiana State Grange, was elected president. M. E. Noblet, secretary of the Hoosier Motor Club, was elected secretary-treasurer. Directors, vice-presidents and an advisory committee also were elected. A. G. Lupton, of Hartford City, was chairman of the organization until the election of Mr. Wright.

Luke W. Duffey, of Indianapolis, is expected to introduce the bill in the

legislature. Several meetings have been held to draft the measure. It was the sense of the meeting Tuesday that the proposed bill as drafted is an excellent measure with provisions for administering the department, which in a few years is expected to give Indiana a good system of main market roads with the federal aid that is proposed.

The bill, it is planned, will be presented to Governor Goodrich for his consideration. Some of the provisions follow his suggestions. One provision suggested by the Governor is that the department shall be headed by four men, not more than two being of the same political party. These men are to serve without pay, and the executive head will be an engineer selected by the board, who is to continue in service as long as efficient.

Much care was taken in preparing the bill to place no power in the state

highway department over roads other than the main market highways. Only on request of the county commissioners or on the petition of fifty freeholders in any county, it provides, will the state highway department give advice over specifications and contracts for roads other than a market road, and on like request or petition provide inspection of construction work at the expense of the county or township. inspection of construction work at the expense of the county or township. Further, the committee framed the bill

(Continued on page 183)

PERSONALS

Buie, Duncan, has been elected chief of the Louisiana state highway department, vice W. E. Alkinson.

Cady, John Hutchins, has been appointed a member of the city plan commission of Providence, R. I., by mayor Gainer. Henry A. Barker was reappointed to the commission.

Conlon, Michael T., has been selected as chief of police of Leominster, Mass.

Muns, Dr. Walter E., has been appointed assistant bacteriologist of Syracuse, N. Y.

Parker, A. V., superintendent of parks of Worcester, Mass., has resigned.

Peevey, Wilson W., has been appointed city secretary of Dallas, Tex. He succeeds J. B. Winslett, who died January 17 after a long illness. Mr. Peevey had been assistant city secretary for seven years.

Rice, Frank J., mayor of New Haven, Conn., died January 18 after a long illness.

Rice, William J., deputy commissioner of public safety of Albany, N. Y., has resigned.

The following have been elected in West Virginia:

Warwood—Mayor, J. H. Montgomery; recorder, John Mitchell; councilmen, (North Warwood) R. J. McCracken and A. G. Reister; (Center Warwood) R. H. McClure and George W. Mooney; (South Warwood) C. Doty, Charles Welchans and J. W. Weiler.

Elm Grove—Mayor, George W. Campbell; recorder, Harry E. Smith; councilmen, H. H. Hedrick, John V. Reister, Henry F. Shafer, Wilford Winters and George B. Gonter.

Paterson—Mayor, Samuel Simms; recorder, C. E. Gittings; councilmen, J. L. Caldwell, George Keller, Silas Garrison, E. C. McGlone and Bryce Sloan.

Riversville—Mayor, J. W. Yoak; recorder, Charles Knight; councilmen, J. S. Freeman, Joseph Hood, J. S. Cogle, George Yost and James Seaman.

Monogah—Mayor, T. G. Price, re-elected mayor for his sixteenth term; recorder, Lee N. Satterfield; councilmen, P. H. McDonald, H. B. Crislip, C. V. Arp, Clarence Curry and J. H. Leonard.

Farmington—Mayor, L. F. Kerns; recorder, G. H. Musgrave; councilmen, John F. Wells, H. L. Kuhn, T. E. Morgan, A. C. Collins and A. C. Fisher.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Hampton, Ia., is to make a number of STREET IMPROVEMENTS, plans having been completed by Theodore S. Delay, Lichty Building, Creston, Ia.

A \$50,000 street and reinforced concrete VIADUCT is to be constructed by Sheboygan, Wis. Plans are being completed by Klug & Smith, 40 Mack block, Milwaukee, Wis.

The city plan commission, mayor and council of Fresno, Cal., have decided to have made a survey and CITY PLAN. Professor Charles H. Cheney has been retained as consultant.

ELECTRIC LIGHT PLANTS are being designed for the cities of Bronson and Bunker Hill, Kans., by W. B. Rollins & Co., 209 Railway Exchange building, Kansas City, Mo.

A new gravity WATER SUPPLY SYSTEM to cost about \$180,000 is to be built by the village of Canton, N. Y. Charles E. Perry, 36 State street, Albany, N. Y., prepared the plans.

Detroit, Mich., is working on an extensive plan for GRADE CROSSING ELIMINATION and has retained Professor H. E. Riggs, of the University of Michigan, Ann Arbor, to act as consulting engineer on the work.

A WATER SUPPLY SYSTEM is to be constructed by the town of Big Sandy, Mont., including a pumping station, pumps, mains and tank. The plans and specifications have been prepared by the Miracle Engineering Company, 437 Ford building, Great Falls, Mont.

Through the Chamber of Commerce, Harrisburg, Pa., is to have a SURVEY of the POLICE DEPARTMENT and of the administration of the school district. The work is to be done, with the cooperation of the city officials, by the New York Bureau of Municipal Research, 261 Broadway, New York.

West Concord, Minn., is to improve its WATERWORKS, the engineer for the work being W. C. Buck, 4821 South Fremont avenue, Minneapolis, Minn.

In making a number of PAVING IMPROVEMENTS, Waupun, Wis., has the engineering services of E. B. Parsons, Jefferson, Wis.

A reinforced concrete RESERVOIR is to be constructed by the city of Winfield, Kans. The consulting engineers for the work are Burns & McDonnell, Interstate building, Kansas City, Mo.

A sanitary SEWER SYSTEM is proposed for Worthington, O. The engineers are Jennings, Lawrence & Lindsay, Hartman building, Columbus, O.

Kaw, Okla., is to construct a \$25,000 ELECTRIC LIGHT PLANT and WATERWORKS, plans being in preparation by the Benham Engineering Co., Colcord building, Oklahoma City, Okla.

To investigate the WATER SUPPLY and plan necessary improvements, the city of Ft. Scott, Kans., has retained Black & Veatch, Interstate building, Kansas City, Mo., as consulting engineers.

The municipalities in the Mahoning Valley, from near Warren to below Youngstown, O., are studying the problems of SEWAGE DISPOSAL. R. Winthrop Pratt, Hippodrome building, Cleveland, O., has been retained as consulting engineer to investigate the situation.

The sanitary district of Chicago, Ill., has been studying the possibilities of big POWER DEVELOPMENTS to serve Chicago and a number of surrounding municipalities. Gardner S. Williams, Ann Arbor, Mich., has been working out plans for presentation to the legislature.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

BITOSAN PAVEMENT.

A New Type of Patented Asphalt-Sand Construction.

Bitosan is a new development in asphalt pavements for which is claimed particularly moderate cost and special durability. It is built in two (or sometimes three) courses. The base or foundation is composed of a specially prepared "Bitosan foundation asphalt cement" and the mineral aggregate of sand or gravel, so incorporated as to be rigid yet resilient to absorb all shocks upon the pavement. A similar layer is added as a second course base where traffic conditions require it. On this is laid the wearing surface which consists of properly graded sand aggregate together with a special filler, which consists of a finely pulverized material incorporated with the "Bitosan surface asphalt."

It is pointed out that Bitosan pavements and roads can be constructed in any locality because sand is the largest ingredient required and needs only to be heated and mixed with the specially prepared Bitosan asphalt cement. The difficulties retarding the use of asphalt for foundations—such as softening in hot weather and brittleness in cold—are said to be overcome in the use of Bitosan, which is described as being less susceptible to effects of weather and temperature.

The general specifications for Bitosan pavement require that the sand for the foundation course "shall be a native product carefully selected with reference to its mesh composition so as to give a mineral aggregate approximating as closely as possible the usual standard grading required for sheet asphalt construction as provided in the specifications of the American Society of Municipal Improvements." The sand is submitted to the Bitosan Laboratory where the proper percentage of Bitosan foundation asphalt to be used is determined. The quantity of special filler and Bitosan surface asphalt is similarly determined from a

sand sample submitted, according to the following procedure: "The specific gravity of the proper combination of asphalt and pulverized material suitable for sand aggregate shall be determined, and this reduced to the same terms as the predetermined void volume in the aggregate. Sufficient of this filler product shall be added to the graded aggregate to fill to the factor of safety the void volume in the sand aggregate as originally predetermined." Instructions for mixing and laying are furnished by the chief chemist of the Bitosan laboratory.

In laying, the foundation course is compressed immediately with a tandem roller and the base carefully protected by covering from dust or sand. After roughening, the wearing surface may be put on immediately.

The advantages claimed therefore for the new pavement are: "1—The foundation or base is rigid and resilient. 2—A complete union or bond between its foundation and wearing surface. 3—Waterproofness throughout. 4—Rapidity of construction; time being saved compared with that necessary to construct Portland cement concrete or broken stone foundation. 5—The greater utilization of an asphalt plant, the same plant turning out the mixture for the base as well as the surface of the pavement, thereby reducing the overhead charges on plant equipment and employing the plant force with greater continuity. Another special feature is the need of less labor for street work, the same crew laying the foundation as well as the surface."

The accompanying illustrations show a construction scene during the laying of a Bitosan foundation and the finished road—the Hatchville Road, Falmouth, Mass.

Bitosan pavements are laid under letters patent, other patents pending. Licenses to lay the pavement under Bitosan specifications are secured from the United States Asphalt Refining Company, 90 West street, New York, N. Y.

PORTABLE ASPHALT PLANT.

Merriman Type of Railroad Equipment.

The Merriman asphalt plants are designed and built with particular emphasis on the economical and rapid handling of asphalt. To attain this end the equipment is "manufactured" rather than merely "assembled"—the factory in which it is produced being completely equipped with modern machinery for making and handling all parts efficiently. This also enables the quick delivery of duplicate parts or special designs. All plants are steamed up and given an exhaustive series of tests before shipment.

The plant consists of separate driven units—the mixer, drum, hot elevator, hoist and air compressor are each driven independently of the other. If one of them stops, therefore, the others can continue in operation—thus helping to reduce the general repair cost. The plant can be assembled or knocked down, it is claimed, with special ease and rapidity. Maintenance and idle time costs are reduced by the construction features of the plant—particularly in the case of the power transmission, engine and drum drive which are inaccessible to fine sand or lime dust.

All melting is done by steam heat. There are a number of advantages of this type of heating over the furnace method. In the latter the asphalt is frequently entrusted to a \$3 a night man who can burn the asphalt so that the poor quality of cement may mean a bad job and patching or the kettle bottom may be burned out, necessitating difficult and time-consuming repairs. The steam coils in the Merriman plant are all electrically welded and all joints are outside the melting tank, so that it is impossible for moisture to reach the asphalt through the steam coils and cause it to foam. The kettles can be thoroughly cleaned.

The Merriman is built in two sizes—



LAYING BITOSAN FOUNDATION AND FINISHED ROAD—HATCHVILLE ROAD, FALMOUTH, MASS.

No. 1 produced on actual work 2,250 sq. yds. of 2-inch top in eight hours and 2,800 sq. yds. in ten—or 3,000 sq. yds. of 1½-inch top. Plant No. 2 has a capacity of 1,600 sq. yds. in ten hours.

The accompanying illustration shows a view of a Merriman plant ready for operation. The plant is the product of the East Iron and Machine Co., Lima, O.

FOUR-WHEEL SCRAPER.

The Baker Maney — Self - Loading, Dumping.

The Baker Maney four-wheel scraper is built to meet the demand for a practical excavator of large capacity with the portability of the two-wheeled scraper, but able to accomplish results equivalent to those of a steam shovel or elevating grader. The particular features claimed for the Baker Maney are: Substantial construction, large capacity—one cubic yard, adaptability to almost all conditions and rapid self-loading and dumping features. The operating costs are found to be comparatively low. Loading is done by a four-horse snap team or by means of a tractor—and with the latter a load a minute speed can be obtained. The elimination of wheeler holders and dump men, with the consequent saving in labor costs, are claimed to practically offset the cost of additional power required for loading as compared with two-wheeled scrapers.

The frame consists of 5-inch 11½ lb. channels. The winding spool is of extra strength 2-inch seamless wrought iron pipe with bearings in end drive securely riveted. The castings are close gray iron of extra quality. The cutting bit is removable, 6x¾-inch double beveled crucible steel. The pan is of 3/16-inch boiler plate, 45 inches deep, 24 inches high and with an average width of 42 inches. The endgate is of similar construction, 45 inches long and 28 inches high, reinforced. The wheel base is 7 ft. 10½ ins., center to center of axles, and the width out to out of hubs (rear) is 6 ft. 8. The rear axles are of 2-inch square extra carbon steel 6 ft. 7 ins. long and the front axles are Concord, 1½ ins. square and 3 ft. 6 ins. long. The wheels are

wood, Sarven type, 46 ins. diameter in rear and 30 ins. front, with 4x¾-in. tires.

The front wheels cut under, allowing the machine to turn in its own length. A strong spring supports the tongue, relieving neck weight. The snatch rod is so placed as to cause a

is spread out in even layers of six inches or less. The wheels, not tracking, pack the material and act as a roller, helping to make a thoroughly compacted dump.

The scraper, which is shown in the accompanying illustrations, is being widely used in road building, street ex-

BAKER
MANEY
SCRAPER
AT WORK



downward pull at the strongest portion of the scraper. The loaded Maney is drawn ordinarily by two horses. It pulls as easily as an ordinary dump wagon and the shipping weight is 2,300 pounds.

The seat is placed conveniently in the rear, allowing the driver easy access to all levers. All operations are very simple, skilled labor being required. The double chain tightener on the sprocket chain prevents slipping and insures a steady motion in raising or lowering the pan. There is a long emergency lever for raising the pan while the machine is standing still and prevents any possibility of the pan getting stuck. This lever also admits of very fine adjustments of depths and helps make grades which are practically finished. The pan is made slightly wider in the rear than in front, allowing sticky material to slide out easily. There is a 4-inch projection on the top of the end gate, allowing the excess dirt to fall in the rear and permitting a heaping load to be carried. The dumping feature is particularly important in securing a dump with the minimum of shrinkage and the least labor. The team does not stop an instant while the load is being dumped. As the dirt comes out from the rear of the pan it

cavation, sod removing, snow removal, levee building, canal construction and all kinds of dirt removal work. For short hauls and smaller jobs, the Township four-wheel scraper with a half-yard capacity is made along similar lines, but with corresponding reduction in weight and size of parts.

These scrapers are made by the Baker Manufacturing Company, Springfield, Ill.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—Formal award of the pipe contract at Cleveland, O., has been made to the leading interest. The lettings at Springfield, Ill., and Pontiac, Mich., for 1,200 tons each, remain to be closed. Quotations: 4-inch, \$44.50; 6-inch and larger, \$41.50; class A, \$1 extra. Birmingham—Manufacturers express themselves as inclined to be satisfied with the new business that has come in spite of high prices and the dull season in building operations. They reiterate that there are very desirable contracts held up on account of prices. Quotations: 4-inch, \$30; 6-inch and upward, \$36. New York—All bids on 2,500 tons have again been rejected by the city of Boston. No announcement has yet been made as to when the third series of bids will be received. No municipal lettings of importance are in sight. The general trade is quiet, but prices are firmly maintained on the basis of \$41.50 for 6-inch, class B and heavier, with class A taking an extra of \$1 per ton.

Lead.—Lead is almost unobtainable for early delivery. Quotations: New York, 7.75 cents; St. Louis, 7.625 cents.

Recent Tests by Bureau of Standards.—Among the tests conducted recently by the United States Bureau of Standards as aids to the development of industrial methods were series relating to the construction of concrete columns and the production of insulating material.



MERRIMAN ASPHALT PLANT.

Three tests were made of a special commercial insulating material to determine its fire-resisting properties. The material submitted by the manufacturers was intended for use in a number of instances to replace wood. The test specimens were about 18 by 18 inches and 6 inches thick. They were placed in a furnace as a panel, one of the larger faces being exposed to the heat of the furnace and the other to the atmosphere. Upon being heated to 950° in 30 minutes and held at that temperature for four hours it was found that the temperature at a distance of 1½ inches from the heat-exposed surface was about 240° C. At a depth of 5½ inches from the heat-exposed surface 66° was the highest temperature recorded. One of the blocks after having been subjected to this heat for the period mentioned was quenched with water. The damage to the specimen that was quenched was found to be less than to an unquenched specimen. This is explained by the fact that the blocks contained considerable organic matter which tended to be disintegrated by the heat transmitted very slowly from the heated surface, even after the flame was removed from it.

The series of tests of concrete columns was partly in the nature of an investigation and partly in the nature of routine testing. These are the first columns of their kind to be tested in this country. The unique feature is a hollow cast-iron core. This is surrounded by concrete, reinforced with both spiral and vertical reinforcing. Such a column may be made very cheaply. Not many results have yet been obtained, but the tests are still in progress. It would appear, however, that the load which these columns can sustain is considerably in excess of that which can be borne by the ordinary reinforced concrete column of an equivalent cross section.

The tire engineers of The Goodyear Tire & Rubber Co., Akron, O., have declared in favor of the single pneumatic tire for truck rear wheels and have during the last year effected an interesting development in this field. "The newest development in this line is a cord pneumatic truck tire," according

to L. C. Rockhill, manager automobile tire department. "The company has for some time been making pneumatic truck tires of fabric construction, but the engineers have now applied the cord principle to these tires. This cord tire for trucks is not a specially constructed tire. It represents simply the application of this principle to tires made in the proper sizes for truck use. They come in the all-weather black tread, and are made in sizes 36x6, 38x7, 40x8 and 42x9, with from 10 to 16 plies of cords, according to the size of the tire."

The Hotchkiss Metal Form Co., Jarvis street, Binghamton, N. Y., is issuing circulars describing and illustrating its very complete line of steel forms for sidewalks, curbs and gutters, concrete walls, culverts, posts and blocks. The Hotchkiss system of culvert construction is particularly interesting in that it uses the regular Hotchkiss channel rails, as used in curb and gutter and wall construction, combined with the Hotchkiss adjustable angles.

The National Lime Manufacturers' Association will hold its 31st annual convention in New York City, Feb. 6 and 7, at the McAlpin Hotel.

George W. Rogers, for ten years a member of the city council of Richmond, Va., and actively identified with the commercial and civic life of the state, has organized the Bacrog Accessories Company to represent manufacturers of machinery, materials and supplies for municipalities, public service corporations and contractors. The Bacrog Company is composed entirely of men experienced in the needs of the field.

NEWS OF THE SOCIETIES

(Continued from page 180.)

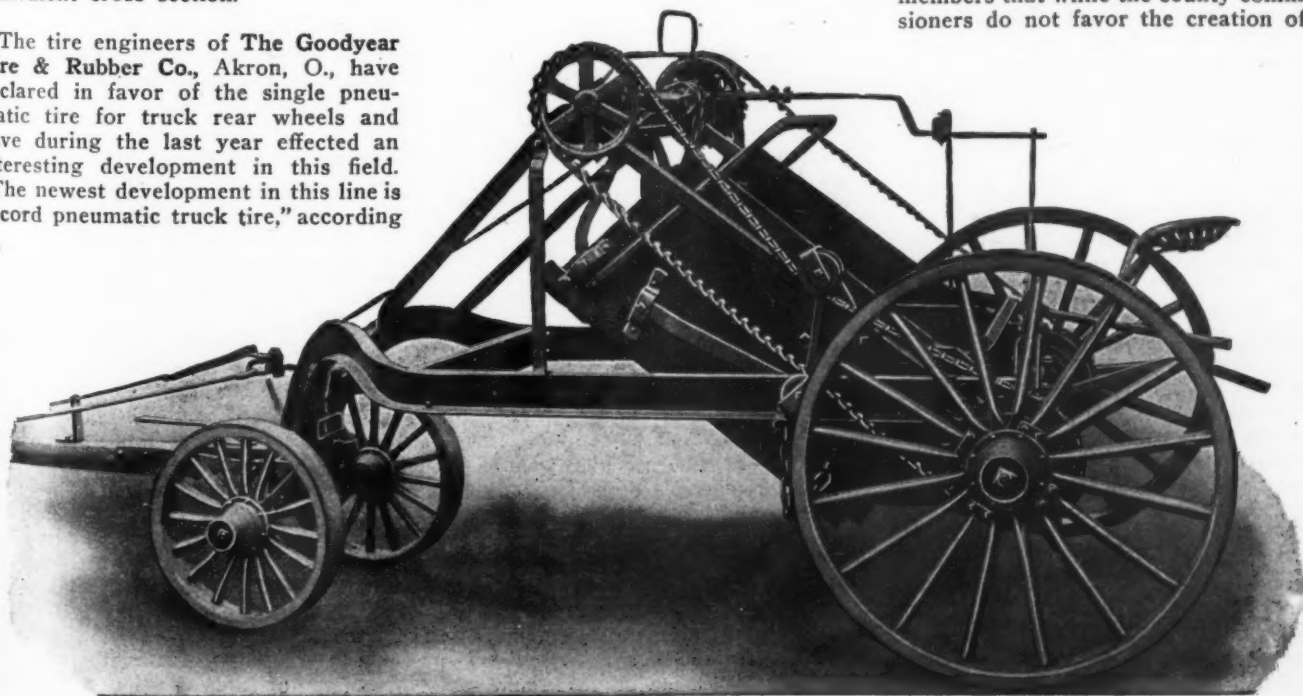
to provide that the state highway department will have no authority of its own over any road for which it does not pay 50 per cent of the cost or 50 per cent jointly with the federal government, and this requirement is necessary to be eligible for federal aid.

The vice-presidents of the permanent organization effected Tuesday follow: William M. Jones, Fairmount, president of the Indiana Federated Bodies of Agriculture; Charles A. Bookwalter, former mayor of Indianapolis; O. C. Smith, president of the Kokomo Chamber of Commerce, president of the state Chamber of Commerce; J. H. Mills, Richmond, manufacturer, and Charles E. McKeen, Terre Haute.

The directors were: A. G. Lupton, Hartford City; W. B. Foresman, Lafayette; James S. Boonshot, Petersburg; Dr. John R. Mitchell, Evansville; C. J. Bradley, Jeffersonville; Martin Luecke, Ft. Wayne; Dr. I. S. Harold, Richmond; W. T. Gott, Crawfordsville; Robert T. Hughes, Indianapolis; W. P. Montgomery, Montezuma; J. Napier Dyer, Vincennes; William O. Protzman, Vevay; Ralph N. Smith, Laporte; C. C. Hanch, South Bend; James P. Goodrich, Winchester; Luke W. Duffey, Indianapolis; Joshua Strange, Marion.

County Commissioners' Association of Indiana.

Proposed highway legislation at the coming session of the legislature occupied practically all the discussion at a special meeting of the County Commissioners' Association of Indiana at the Hotel Severin, Indianapolis, Dec. 15. It appeared from the talks of the members that while the county commissioners do not favor the creation of a



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state highway commission, they feel that legislation of that character is bound to come and that they seek to have it so framed as to embody as many as possible of their ideas.

The consensus of opinion was that a road commission should be placed on an economical basis, and it should not have absolute power and control over the highway system of the state; that it should not have power to appoint county highway superintendents, but that these appointments should be made by the county commissioners as at present; that each county should have the right to determine what roads shall be improved and to determine also the kind of material that shall be used, and that the cost of highway improvement shall be divided equally between the state and the county, the money to be spent by the county.

A legislative committee composed of George O. Schaaf, of Lake county; U. S. Hauck, of Cass county; William Reppert, of Adams county; J. C. F. Redinbo, of Tippecanoe county, and Emsley W. Johnson, county attorney of Marion county, was appointed to prepare a bill embodying the ideas of the county commissioners and present it to the legislature. It was said, however, that if the bill to be introduced by Luke W. Duffey, representative from Marion county, for the creation of a state highway commission, appears to the commissioners to meet with favor among the legislators they will seek to amend it so as to meet, as far as possible, the ideas of the commissioners.

County Engineers' Association of New Jersey.

Without specifying any particular method of raising funds for a state highway system, the County Engineers' Association of New Jersey meeting at Trenton, Jan. 16, advocated widespread road improvements in the state, made in a systematic manner. Papers having to do with road conditions and technical engineering problems were read by the sixteen engineers present, state road commissioner Stevens and state engineer Meeker.

By special permission from motor vehicle commissioner Dill, engineer Wasser of Hudson county read the final report of the special committee on the regulation of commercial motor vehicles.

A change has been made in the schedule of fees which was one of the points objected to at the public hearings held by the committee. The provision calling for sealed governors is retained, but will not affect present equipment. Trucks will not be required to carry a spare wheel, as was at first suggested, but a heavy fine for operating with a damaged wheel or tire is retained.

Provision is made for placing signs on all bridges to show the maximum weight permitted, and bills to hold owners responsible for damages if this weight is exceeded will probably be introduced. The schedule of truck weights has been simplified.

Speaking on "Road System," engineer Reimer of Essex favored its division into four phases, those of military, state, county and municipal. "At the present time there is no road leading across the state of New Jersey from any of our principal cities which would carry the heavy armament used during military operations," said Mr. Reimer.

Such roads should be laid out after consultation and advisement with the United States military authorities, who should designate the locations for and plans of the highways, Mr. Reimer said. The money obtained under the federal aid act and a like amount from the state should be used for this work, he held.

State highways should be laid out with consideration for the points to be connected and amount and character of traffic, the speaker said, rather than with the idea of using old roads and catering to purely local conditions. Mr. Reimer spoke against using the present roads as foundations for new surfacing unless it was proven that the foundations were sufficiently heavy to give lasting wear. Curves, turns and steep grades should be eliminated as much as possible from these highways, it was asserted, and rebuilding of bridges should be included in this plan.

Other points emphasized by Mr. Reimer were: County roads should be built to connect important cities and to act as connecting links with other county highways; money received from the motor vehicle funds should be appropriated to the counties for extension of such roads; municipalities should do their part in completing the system, all working on a co-operative plan, which in time would assure a systematic network of roads throughout the state.

The necessity of building more and better roads was pointed out by engineer Bauer of Union county.

Engineer McClave of Bergen county advocated the standardization of road signs. The new \$200,000 boulevard connecting Atlantic City with Ocean City was described by engineer Rice of Cape May.

Mr. Bauer was elected president. The other officers elected were: Vice-president, engineer Logan, of Burlington; secretary, Garwood Ferguson, of Passaic; treasurer, Alvin B. Fox, of Middlesex.

Florida Association of County Commissioners.

With a view to bringing about a closer relation and better understanding between the various boards of county commissioners of Florida, plans are now under way for a state convention to be held in February. This matter has been taken up by L. L. Meggs, chairman of the board of commissioners of Duval county, he having been urged to take the active steps in arranging for the meeting.

Letters have been prepared and sent to each board of commissioners in the state, inviting their opinions and if

possible their support in the movement. It is tentatively proposed to hold the convention in Jacksonville, and the date has been left to the various boards, although February was selected to allow of reorganization and general arrangement of affairs after new county officers take their seats.

It has been proposed that the convention be devoted to discussion of various matters of great importance to the counties, and these subjects will embrace road building, convict employment, bonding, public institutions, legislation and many other things which have an important bearing on the work, and conduct of affairs of the respective counties. The point has been raised that the road work now being carried on by individual counties, depends to a great extent on the operations in neighboring counties to be a perfect success, and the convention would be a great help in bringing about a close co-operation in this and other lines of work.

Montana Institute of Municipal Engineers.

At a meeting of this society held at Helena, Jan. 15, 16 and 17, Bozeman was selected as the place for the next meeting and the following officers elected: C. C. Widener, of Bozeman, president; Andrew C. Birklaus, of Lewistown, vice-president R. E. Malso, of Bozeman, secretary-treasurer.

Ohio State Fire Prevention Association.

Preparations are being made for the coming meeting of the Ohio State Fire Prevention Association, which will be held at Lima, Feb. 14 and 15. The chamber of commerce will entertain the association and all sessions will be held in the auditorium belonging to that organization.

About 100 representatives of various fire insurance companies will be present. The members will make an inspection of every building in the downtown district of Lima and offer suggestions, if any, for the prevention of fire. The public will be invited to one session.

Pikes Peak Highway Association.

Dates for the annual meeting of the Pikes Peak Ocean-to-Ocean Association have been set for Feb. 13, 14 and 15. This meeting, like all other meetings of the association, will be held in St. Joseph, Mo.

The 1917 meeting is expected to prove the most important in the history of the association. At this meeting the western and eastern sections of the great central highway, which crosses the country from Atlantic to Pacific, will be determined definitely.

At this time the road extends from Philadelphia to Salt Lake City. It is proposed to lay it out to New York or possibly Boston, and from Salt Lake City to San Francisco, at the coming meeting.

C. F. Adams of Chillicothe, Mo., is president of the association; A. W. Henderson, Colorado Springs, is the secretary-treasurer.

ADVANCE CONTRACT NEWS

ADVANCE INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS.				
Ky.	Olive Hill	.....Feb.	2..Improving streets, \$40,000 available.....	City Clerk
O.	Cincinnati	.....noon, Feb.	2..Macadam road work; cost, \$6,000.....	W. H. Boeh, Co. Engr.
N. J.	Pohatcong	.....2 p.m., Feb.	2..7,000 sq. yds. road work.....	F. L. Pursell, Twp. Clk.
O.	Newark	.....Noon, Feb.	2..16,000 sq. yds. brick or asphalt pavement, curbs, etc.....	W. C. Christian, Dir. Public Service.
N. J.	Belvidere	.....Feb.	3..7,000 sq. yds. pavement.....	State Comr. of Public Roads, Trenton
Mich.	Grosse Ile	.....3 p.m., Feb.	3..Constructing 5 miles of road.....	Robt. Johnson, Highway Comr.
Tex.	Mt. Vernon	.....noon, Feb.	4..Constructing highway system complete.....	Judge Reeves, Co. Judge.
Ind.	Jeffersonville	.....10 a.m., Feb.	5..Constructing macadam road.....	G. W. Stoner, Co. Aud.
Ind.	Brownstown	.....1 p.m., Feb.	5..Three concr. roads, one tarvia mac. and one gravel.....	Albert Luedtke, Co. Aud.
Minn.	Montevideo	.....Feb.	5..17,537 sq. yds. of wood block pavement and 660 sq. yds. concrete or bitulithic pavement.....	B. O. Bonn, City Clerk.
Ind.	Williamsport	.....9 a.m., Feb.	5..Constructing 4,033 ft. of gravel road in Liberty Twp.....	E. W. Edwards, Aud.
Ind.	Kentland	.....2 p.m., Feb.	5..Constructing macadam road in Beaver Twp.....	S. R. Sizelove, Co. Aud.
Cal.	Berkeley	.....10 a.m., Feb.	5..Paving streets.....	G. E. Gross, Clerk, Co. Supvra.
Ind.	Connersville	.....2 p.m., Feb.	5..Constructing gravel road.....	Glen Zell, Co. Aud.
Ind.	Greenfield	.....10 a.m., Feb.	5..Constructing stone roads.....	H. J. Rhue, Co. Aud.
Ind.	Versailles	.....noon, Feb.	5..Constructing stone roads.....	J. F. Lochard, Co. Aud.
Ind.	Cannelton	.....noon, Feb.	5..Constructing macadam road.....	M. C. Conway, Co. Aud.
Ind.	Rushville	.....2 p.m., Feb.	5..Two miles of macadam road.....	W. H. McMillin, Co. Aud.
Miss.	Port Gibson	.....Feb.	5..Six miles concrete sidewalk.....	City Clerk.
Ind.	Evansville	.....10 a.m., Feb.	5..Constructing county road.....	C. P. Beard, Co. Aud.
Ind.	Franklin	.....2 p.m., Feb.	5..One and one-quarter miles gravel road.....	John Gregg, Co. Aud.
Miss.	Natchez	.....Feb.	5..Improving Upper River Road.....	H. B. Vaughan, Pres. Bd. of Supervisors.
Cal.	Oakland	.....10 a.m., Feb.	5..Paving on San Pablo Ave.....	G. E. Gross, Co. Clk
Minn.	St. Paul	.....10:30 a.m., Feb.	5..Grading a number of streets.....	H. W. Austin, Pur. Agt.
Cal.	Modesto	.....Feb.	5..14 miles of highway construction.....	Hugh Benson, Co. Clerk
Pa.	Bloomsburg	.....Feb.	5..Wood block paving on bridge.....	D. A. Keefe, Athens, Pa.
Ind.	Indianapolis	.....10 a.m., Feb.	5..Paving several streets.....	B. J. T. Jeup, City Engr.
Wis.	Oshkosh	.....2 p.m., Feb.	5..50,000 gallons road oil, 1 motor street sweeper, 1 motor oiler, flusher and sprinkler.....	Board of Pub. Works
D. C.	Washington	.....2 p.m., Feb.	5..Granite block paving, cost \$50,000.....	Chief Clerk, Engineering Dept. District Bldg.
Ky.	Louisville	.....Noon, Feb.	5..Grading and draining several streets.....	Board of Park Commrs.
Cal.	Fresno	.....5 p.m., Feb.	5..Paving with bitulithic.....	W. H. Ryan, City Clerk.
Minn.	Red Lake Falls	.....8 p.m., Feb.	5..500 yards gravel.....	Jos. Perrault, City Clerk.
Minn.	Buffalo	.....1 p.m., Feb.	6..Graveling state road No. 2.....	J. A. Berg, Co. Aud.
Minn.	New Ulm	.....5 p.m., Feb.	6..100,000 gals. asphalt road oil.....	Wm. Backer, City Clerk.
Pa.	Philadelphia	.....Feb.	6..Grading streets, cost \$105,800.....	W. H. Connell, Chief, Bureau of Highways.
Kan.	Leavenworth	.....5 p.m., Feb.	6..45,000 sq. yds. tar macadam; cost, \$66,150.....	H. A. Perkins, City Engr.
Ill.	Berwyn	.....8 p.m., Feb.	6..Paving with asphaltic concrete.....	O. M. Lindahl, Sec. B. L. I.
O.	Zanesville	.....Noon, Feb.	6..Grading, paving and curbing.....	Dir. Public Service.
Ind.	Rockville	.....11 a.m., Feb.	6..Constructing gravel road.....	Chas. Davis, Co. Aud.
Ind.	Martinsville	.....1:30 p.m., Feb.	6..Constructing county road.....	Sam Watson, Co. Aud.
La.	Traer	.....Feb.	6..30,000 sq. yds. street paving.....	T. F. Stokes, City Clerk.
Okla.	Okla. City	.....noon, Feb.	6..Paving a number of streets with Okla. natural rock asphalt on 4-in. concr. base; and appurtenances.....	C. F. Semmelbeck, City Clerk.
N. J.	West Orange	.....8:15 p.m., Feb.	6..12,000 sq. ft. concrete gutter and 3,000 ft. concrete curb.....	C. A. Winston, Town Engr.
O.	Cincinnati	.....noon, Feb.	6..Paving with brick.....	Chief Engr., Dept. Pub. Serv.
Fla.	Palatka	.....Feb.	6..Roads, bridge and culvert construction.....	C. E. Rowton
Miss.	Jackson	.....Feb.	6..16 miles of gravel road.....	Clerk Co. Supervisors
Ill.	Oak Park	.....Feb.	6..25,500 sq. yds. brick paving.....	Bd. of Local Improvements.
Nebr.	Omaha	.....10 a.m., Feb.	6..Paving, curbing and improving streets.....	T. J. O'Connor, City Clerk.
Ky.	Inez	.....Feb.	6..Improving several streets.....	City Clerk
Ky.	Grayson	.....Feb.	6..Street improvement, \$125,000 available.....	City Engineer.
Wash.	Friday Harbor	.....1 p.m., Feb.	6..One mile of road on Lopez Island.....	County Engineer.
Fla.	Perry	.....10 a.m., Feb.	6..Constructing 87 miles of improved highways.....	J. C. Calhoun, Clerk, County Commissioners.
Ind.	Logansport	.....10 a.m., Feb.	6..Constructing county road.....	A. P. Flynn, Co. Aud.
Ind.	Delphi	.....noon, Feb.	6..Two gravel and macadam roads.....	H. D. Good, Co. Aud.
Ind.	Mt. Vernon	.....2 p.m., Feb.	6..Stone and gravel roads.....	J. R. Haines, Co. Aud.
Ind.	Wabash	.....10 a.m., Feb.	6..Five gravel and two stone roads.....	F. P. Kircher, Co. Aud.
Ind.	Spencer	.....1 p.m., Feb.	6..Two stone and gravel roads.....	S. M. Royer, Co. Aud.
Ind.	Bedford	.....1 p.m., Feb.	6..Constructing two gravel or macadamized roads, 8,775 and 10,987 ft.	D. H. Moffitt, Aud.
Ky.	Mt. Olivet	.....Feb.	6..Road work during 1917, \$30,000 available.....	County Clerk
Ind.	Kokomo	.....10 a.m., Feb.	6..Constructing gravel and stone roads.....	W. L. Benson, Co. Aud.
Ind.	Crawfordsville	.....10 a.m., Feb.	6..Gravel and limestone roads.....	Dr. W. F. Batman, Co. Aud.
Ind.	Rochester	.....2 p.m., Feb.	6..Constructing stone roads.....	E. A. Smith, Co. Aud.
Ind.	Corydon	.....2 p.m., Feb.	6..Constructing macadam roads.....	Sam C. Mauck, Co. Aud.
Ind.	Brazil	.....10:30 a.m., Feb.	6..Constructing two stone and gravel roads.....	W. O. Graesser, Co. Aud.
N. J.	Neshanic	.....Feb.	6..12,000 sq. yds. macadam pavement.....	C. Van Cleef, Clerk, Twp. Committee.
Ind.	Auburn	.....10 a.m., Feb.	7..Constructing stone road.....	S. P. Nelson, Co. Aud.
Ind.	Lafayette	.....10 a.m., Feb.	7..Constructing stone road.....	G. W. Baxter, Co. Aud.
Ind.	Wabash	.....10 a.m., Feb.	7..Creosote block floor on bridge.....	F. P. Kircher, Co. Aud.
N. J.	Burlington	.....Feb.	7..31,000 sq. yds. pavement.....	Harry Hawkins, Jr., Chrmn. Bd. of Freeholders
N. Y.	Batavia	.....Noon, Feb.	7..50,000 to 125,000 gallons non-asphaltic road oil.....	I. J. Carmichael, City Clk.

BIDS ASKED FOR

STATE	CITY	RECD UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Nebr.	Grand Island	8 p.m., Feb.	7..24,806 sq. yds. asphalt, v. f. brick, or asphaltic concrete pavement; 10,266 feet curb and some sewers.....	H. E. Clifford, City Clerk
N. Y.	Brooklyn	11 a.m., Feb.	7..Paving with asphalt and granite and curbing.....	Bur. of Highways, 50 Court St.
Ill.	Chicago	Feb.	7..Concrete or asphaltic concrete county highways.....	Geo. Quinlan, Co. Engr.
Ind.	Muncie	10 a.m., Feb.	7..9 gravel or macadam roads.....	F. M. Williams, Co. Aud.
Ia.	Des Moines	9 a.m., Feb.	7..Paving several streets with sheet asphalt.....	Horace Susong, City Clerk.
N. Y.	Patchogue	noon, Feb.	8..Two miles concrete road construction.....	C. E. Dare, Town Highway Superintendent
Ind.	Indianapolis	10 a.m., Feb.	8..Constructing gravel road.....	L. K. Fesler, Co. Aud.
Ind.	Crown Point	1 p.m., Feb.	8..Constructing several roads.....	Edward Simon, Co. Aud.
Ind.	New Albany	Feb.	8..Road construction.....	Emile Dupaquier, Co. Aud.
Ind.	Frankfort	2 p.m., Feb.	8..Two and one-half miles gravel road.....	Edward Spray, Co. Aud.
Ky.	Columbia	Feb.	8..Street paving, cost \$30,000.....	City Commissioners
Mich.	Lapeer	Feb.	9..Six miles gravel road.....	H. W. Davis, Chr. Co. Comra.
Ind.	Liberty	1 p.m., Feb.	10..Constructing county line roads.....	G. W. Wray, Co. Aud.
Ky.	Georgetown	Feb.	12..Improving several streets.....	City Clerk.
N. J.	Camden	11 a.m., Feb.	12..Constructing gravel road.....	J. J. Albertson, Co. Engr.
Ky.	Irvine	Feb.	12..1.5 mile state aid road construction.....	J. A. Alexander, Co. Clerk.
O.	Cleveland	noon, Feb.	12..Paving and improving streets in East View.....	Pease Engineering Co., Marshall Bldg., Cleveland.
Ill.	East Dubuque	4 p.m., Feb.	13..1,550 sq. yds. brick pavement on bridge.....	M. Tschirgl & Sons, Engrs, Amer. Trust Bldg., Cedar Rapids, Ia.
Ky.	Jamestown	Feb.	13..Co. road work, \$50,000 available.....	County Judge.
Ky.	Albany	Feb.	13..Co. road work, \$40,000 available.....	Co. Commissioners.
Md.	Baltimore	Noon, Feb.	13..8.40 miles concrete or bit. macadam roads.....	State Roads Commission.
O.	Columbus	Noon, Feb.	13..Grading and paving several streets.....	Henry Maetzel, Chief Engr.
W. Va.	Charleston	11 a.m., Feb.	14..3.2 miles brick or concrete road.....	F. G. Burdette, Engr., Court House.
Md.	Baltimore	11 a.m., Feb.	14..About 300,000 sq. yds. first class pavement.....	L. G. Turner, Chairman Paving Com.
Mich.	Monroe	Feb.	14..Completing 15 miles concrete roads.....	Monroe Road Commission.
O.	Columbus	10 a.m., Feb.	14..Constructing state highways.....	Clinton Cowen, St. Highway Comr.
Md.	Baltimore	Feb.	14..Paving with asphalt, brick, wood block, granite block and relaid granite block.....	L. G. Turner, Chairman Paving Committee.
Ind.	Noblesville	10 a.m., Feb.	15..One concrete and six gravel roads.....	W. O. Horton, Co. Aud.
Ia.	Hampton	Feb.	15..90,000 sq. yds. pavement and concrete curb.....	T. S. DeLay, Engr., Creston.
Pa.	Newcastle	11 a.m., Feb.	15..Six miles 16-foot concrete road.....	T. A. Gilkey, Engr., Mercantile Bldg.
Pa.	Ruffsdale	10 a.m., Feb.	15..Grading and macadamizing.....	James M. Baker.
Wis.	Waupun	1:30 p.m., Feb.	15..15,000 sq. yds. hard surface pavement.....	E. B. Parsons, Engr., Jefferson.
N. J.	Flemington	Feb.	15..5,600 ft. road construction.....	Board of Freeholders
Ont.	London	Feb.	15..Asphalt paving work, cost \$60,000.....	City Engineer.
Ind.	Brazil	10.30 a.m., Feb.	16..Stone and gravel road.....	W. O. Graesser, Co. Aud.
Ind.	South Bend	11 a.m., Feb.	19..Constructing concrete roads.....	A. F. Wolf, Co. Aud.
W. Va.	Fayetteville	Feb.	19..46 miles bit. macadam, concrete, brick or asphalt road construction, requiring 150,000 cu. yds. grading.....	R. S. Steagal.
S. Dakota	Madison	7 p.m., Feb.	19..Paving several streets.....	C. A. Trimmer, City Engr.
Cal.	Stockton	Feb.	19..Improving three streets.....	E. D. Graham, Co. Clerk.
O.	Chicago Junction	Feb.	19..Brick paving, cost \$16,000.....	E. K. McMorris, Village Clerk.
N. J.	Camden	8 p.m., Feb.	19..Furnishing 3 five-ton motor trucks with asphalt bodies; constructing concrete sidewalk; furnishing fuel oil, cement, stone dust, crushed stone, asphalt sand and asphalt, 50 tons of each.....	L. E. Farnham, City Engr.
N. Y.	Albany	1 p.m., Feb.	19..Constructing state highways.....	Edwin Duffey, St. Highway Comr.
W. Va.	Parkersburg	Feb.	21..22,000 sq. yds. brick pavement.....	T. L. Higgs, City Engr.
Va.	Grundy	Feb.	22..Improving streets, cost \$25,000.....	City Clerk
W. Va.	Fayetteville	Feb.	26..Macadam, brick, concrete and asphaltic concrete road improvement; cost, \$950,000.....	K. J. McGrath, Engr., Mt. Hope.
N. B.	St. John	Feb.	26..400 tons of asphalt.....	G. F. Fisher, Comr. of P. Wks.
Wash.	Seattle	Feb.	28..Concrete or brick pavement cost \$100,000.....	S. J. Humes, Co. Engr.
Ky.	Tompkinsville	Feb.	28..Street improvement, cost \$25,000.....	City Clerk.
Ky.	Whitley City	Feb.	28..Street paving, cost \$30,000.....	Mayor.
Conn.	Manchester	March	1..Concrete walks and curbs, cost \$23,000.....	J. F. Bowen, Town Engr.
Ind.	Crawfordsville	10.30 a.m., Mar.	8..Constructing gravel road.....	Dr. W. F. Batman, Co. Aud.
O.	Cadiz	March	15..County road work; cost, \$16,000.....	County Clerk.
Ill.	Canton	March	30..Road work, \$20,000 available.....	E. F. Molsinger, Co. Highway Supt.
Ill.	Naperville	March	30..Concrete paving, \$105,000 available.....	C. A. Ashley, City Engr.
Ill.	Virginia	April	1..Road improvement; cost, \$14,000.....	Co. Clerk.
Ky.	Madisonville	April	3..Two miles macadam road.....	County Clerk
SEWERAGE.				
Minn.	Buffalo	1 p.m., Feb.	2..Constructing drainage ditches; cost, \$15,000.....	J. A. Berg, Co. Aud.
Ia.	West Union	2 p.m., Feb.	2..20,000 ft. of sewers; cost, \$15,000.....	City Clerk.
O.	Toledo	Feb.	2..Constructing sanitary sewer.....	Gabe Cooper, Co. Aud.
Mich.	Flint	Feb.	2..Constructing Wilber tile drains.....	A. H. Reid, Co. Drain Comr.
Minn.	Minneapolis	3 p.m., Feb.	2..400 tons sewer castings.....	K. E. Alexander, Pur. Agent
Ore.	Hubbard	8 p.m., Feb.	2..Construction of septic, outlet and connection.....	J. L. Calvert, City Recorder.
Minn.	Buffalo	Feb.	2..Drainage ditch, cost \$11,300.....	County Aud.
Ind.	Plymouth	2 p.m., Feb.	3..Constructing tile ditch.....	A. W. Thomson, Constr. Comr.
Ia.	Rockwell City	Feb.	5..Disposal plant; \$10,000 available.....	F. E. Burnham, City Engr.
Minn.	St. Peter	Feb.	5..18 miles of tile drain.....	W. H. Holz, Co. Auditor
Mich.	E. Grand Rapids	Feb.	5..One mile 10 to 30-in. sewers.....	J. R. Rumsey, Engr., Grand Rapids.
Minn.	St. Paul	10:30 a.m., Feb.	5..Sewer construction either by contract or force account.....	H. W. Austin, Pur. Agt.
O.	Alliance	Feb.	5..Improving sewage disposal plant.....	City Engineer
N. Y.	L. I. City	11 a.m., Feb.	6..Constructing several sewers.....	M. E. Connolly, Boro Pres.
Ill.	Berwyn	8 p.m., Feb.	6..Vitrified tile sewer.....	O. N. Lindahl, Sec. B. L. I.
O.	Columbus	Noon, Feb.	6..Constructing large and small sewers.....	G. A. Borden, Dir. Pub. Serv.
Ga.	Savannah	noon, Feb.	7..1,370 ft. concrete box storm sewer.....	E. R. Conant, City Engr.
N. Y.	Brooklyn	11 a.m., Feb.	7..Sewer construction, cost \$93,802.....	Bureau of Sewers, 215 Montague St.
Md.	Baltimore	11 a.m., Feb.	7..Furnishing 27-inch terra cotta sewer pipe.....	R. M. Cooksey, Highway Engr.
O.	Cleveland	noon, Feb.	8..Sewers in several streets.....	Comr. of Engrs.
Ia.	Sibley	11 a.m., Feb.	8..Drainage ditch, requiring 286,950 feet of tile, 6 to 42-in. L. A. Wilson, Engr.	
Minn.	Austin	10 a.m., Feb.	10..Constructing tile drainage ditch.....	O. J. Simmons, Co. Aud.
O.	Cleveland	noon, Feb.	12..Storm and sanitary sewers in East View.....	Pease Engrs. Co., Marshall Bldg.
Ind.	Anderson	Feb.	12..9,500 feet of sewer, cost \$13,000.....	E. A. Funk, City Engr.
Ia.	Pringhar	Feb.	13..Tile drains, cost \$22,000.....	J. C. Kerrigan, Co. Engr.
N. J.	Ridgefield	9 a.m., Feb.	14..Constructing sewer system.....	C. F. Blood, Engr., Morsemere, N. J.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ind.	Lafayette	Feb. 14.	33,613 feet 8 to 12-inch vit. sewers, 6 jobs, total cost \$56,236	H. B. Overesch, City Engr.
O.	Wyoming	noon, Feb. 14.	Constructing several sewers	G. H. Eversman, Village Clk.
Kans.	Humboldt	Feb. 19.	Constructing main and lateral sewers	C. H. Shaffner, City Clerk.
N. J.	Camden	8 p.m., Feb. 19.	Sewers in many streets	L. E. Farnham, City Engr.
N. Y.	Oswego	2 p.m., Feb. 20.	6,800 feet 6 and 12-inch sewers	City Engr
Idaho	Emmett	Feb. 21.	Disposal plant and 7,800 ft. 15 and 24-in. sewers; cost, \$17,000	G. W. Knowles, Engr.
N. Y.	Brooklyn	11 a.m., Feb. 21.	Sewage pumping equipment	Bureau of Sewers, 215 Montague Street.
Mont.	Big Sandy	8 p.m., March	1.. Disposal plant, 1,850 ft. tile sewers, 600 ft. c. i. force main and pumping station with electric pumps	Miracle Engrg. Co., Ford Bldg., Great Falls.
Minn.	Mankato	9.30 a.m., Mar.	5.. Constructing sewer in Rock Street	F. W. Bates, City Clerk.
Wis.	Chilton	Mar.	6.. Constructing sewer system, cost \$22,000	Jerry Donohue, Engr., Sheboygan, Wis.
Ind.	Shelbyville	March	6.. Constructing sewer	City Engr.
Ill.	Hillsboro	April	1.. Constructing sewer system; cost, \$12,000	W. A. P. Warren, City Engr.
India	Calcutta	2 p.m., June	1.. Storm water pumping plant	C. C. Chatterjee, Sec. Corp. of Calcutta.
WATER SUPPLY.				
Kans.	Winfield	Feb.	5.. 1,750,000-gallon concrete reservoir	Burns & McDonald, Engrs., Interstate Bldg., Kansas City, Mo.
Minn.	St. Paul	10.30 a.m., Feb.	5.. Furnishing material for construction reservoir	Engr., Bd. of Water Comrs.
Can.	Winnipeg	noon, Feb.	5.. Indicating and recording apparatus for two Venturi meters	R. D. Waugh, Chmn. of Comrs.
O.	Columbus	Noon, Feb.	5.. 400 tons bauxite ore	G. A. Borden, Pres., Bd. of Purchase.
O.	Geneva	Feb.	5.. Filter plant and sedimentation plant	John Reeves, Supt. of Water Works.
Ill.	Cicero	8 p.m., Feb.	5.. Three 1,500-gallon motor driven centrifugal pumps	Chas. Stoffell, Town Clerk.
N. Dak.	Harvey	8 p.m., Feb.	5.. 60,000-gallon wood or steel tank on 90-foot steel tower, now in place	L. W. Miller, City Aud.
Mich.	Flint	2 p.m., Feb.	6.. Additions to purification plant	Board of Water Comrs.
O.	Canton	noon, Feb.	6.. Trenching machine, back filler, w. i. pipe, curb boxes and curb cocks	L. B. Ohlinger, Supt. Water Works
N. J.	New Brunswick	Feb.	6.. 12,000 ft. 6 and 8-in. c. i. pipe	E. F. Farrington, Dir. of Pub. Affairs
Neb.	Florence	Feb.	7.. Pumping station with 30,000,000 gallons daily capacity	R. B. Howell, Mgr. Metropolitan Water District
N. Y.	New York	2 p.m., Feb.	7.. Furnishing and laying water main	Corp. Counsel, 2351 Municipal Bldg.
Va.	Coeburn	Feb.	7.. Water works improvements	City Commissioners
Nebr.	Florence	4 p.m., Feb.	7.. Pumping station with capacity of 30,000,000 gallons per day	R. B. Howell, Mgr.
S. D.	Castlewood	Feb.	8.. 8,000 ft. mains and elevated tank on 100-ft. tower	Freed & Sours, Engrs., Watertown.
O.	Middletown	Feb.	8.. Improving water system	City Engineer.
O.	Ravenna	Mar.	10.. Improving waterworks	Dir. Public Service.
Ont.	York	Noon, Feb.	12.. Furnishing cast iron pipe, valves and hydrants	Frank Barber, Township Engineer, 57 Adelaide St., East, Toronto.
O.	Akron	Feb.	14.. Two 300-h. p. water tube boilers	Dir. Pub. Service
Minn.	Detroit	8 p.m., Feb.	15.. 25,000 feet 4 to 8-inch mains, 37 hydrants and 47 valves	E. J. Bestick, City Clerk.
Minn.	Thief Riv. Falls	8 p.m., Feb.	20.. 2 12-inch wells, about 240 feet deep	A. H. Fasel, City Clerk
N. Dak.	Mohall	8 p.m., Feb.	27.. Waterworks system, including mains, hydrants, pumping plant, steel tower and tank	Tollef Syverson, City Aud.
Ill.	Watseka	March	1.. 7,500 ft. water main construction	J. L. Smiley, Commissioner.
Ill.	Springfield	Mar.	1.. 3.5 miles 24-inch water main extension; cost, \$90,000	City Engineer.
Mont.	Big Sandy	8 p.m., March	1.. Pump station and pumps, 3,500 ft. 6-in. steel main and 100,000-gal. tank on 75-ft. tower	Miracle Engrg. Co., Ford Bldg., Great Falls.
Wis.	Chilton	Mar.	6.. Constructing water works system, cost \$45,000	Jerry Donohue, Engr., Sheboygan, Wis.
Ill.	Gibson City	April	1.. Constructing water and light plant	City Clerk.
MISCELLANEOUS.				
N. Y.	New York	2 p.m., Feb.	2.. 15 autos, 2-passenger type, and 10 1-ton motor trucks	Wm. Williams, Comr., Dept. Water Supply, Gas & Elec.
Ore.	Astoria	Feb.	3.. One 800 or 1,000-gal. capacity auto street flusher	City Council.
Miss.	Greenville	noon, Feb.	5.. Traction engine for road work	J. S. Allen, Chief Engr., Highway Commission.
Ind.	Terre Haute	Feb.	5.. Park work, including lighting system and sidewalk construction	Ned Fitzpatrick, Supt. Parks.
N. Y.	Buffalo	11 a.m., Feb.	5.. Motor tractor with power take-off; furnishing 2,000 to 2,250-gal. street flusher	A. W. Kreinheder, Comr. of Public Works.
Tex.	Houston	Feb.	6.. Constructing 50 miles and canals and laterals, requiring about 650,000 cu. yds. of excavation; block and flume construction	Cameron Co. Irrigation Dist. No. 1, Harlingen, Tex.
Pa.	Philadelphia	Feb.	6.. Subway construction	Wm. Twining, Dir. of City Transit
S. C.	Charleston	Feb.	6.. Vertical air pump	Lighthouse Inspector.
Ill.	Chicago	Feb.	7.. 243,000 fire brick and 60 tons fire clay	F. I. Bennett, Comr. Public Works.
Ind.	Monticello	1 p.m., Feb.	10.. Constructing two drainage ditches	Paul Ward, Drainage Comr.
Ind.	Monticello	1 p.m., Feb.	10.. Constructing drainage ditch	Geo. Thomas, Drainage Comr.
La.	Estherville	noon, Feb.	12.. Constructing drainage ditches	J. J. Klopp, Co. Aud.
Minn.	W. M'n'p'l's	7:30 p.m., Feb.	13.. Constructing municipal gas plant	E. A. Close, Recorder.
South Africa	Johannesburg	Feb.	15.. Machinery for utilizing by-products at municipal abattoirs	Municipal Council.
Ont.	London	Feb.	15.. Furnishing 7,000 bbls. of cement and vitrified sewer pipe during 1917	Harry Brazier, City Engr.
N. J.	Camden	7.30 p.m., Feb.	15.. 2 chasses for police patrol	City Clerk.
Mich.	Lansing	4 p.m., Feb.	19.. Portland cement during 1917	City Engr.
D. C.	Washington	Feb.	19.. Furn. and instal. one 40-ton and ten 4-ton bridge cranes at Norfolk, Phila. and Puget Sound Navy Yards	Bureau of Yards & Docks, Navy Dept.
N. J.	Washington	Feb.	19.. Lighting streets for five years	J. H. Hahn, Boro Clerk.
Wis.	Wautona	10.30 a.m., Jan. 20.	1,000 bbls. cement	Fred Grimm, Co. Highway Comr.
Mont.	Great Falls	8 p.m., Feb.	20.. Motor combination street sprinkler and sweeper	L. B. Evensen, City Engr.
La.	Alexandria	8 p.m., March	7.. Levee constr., requiring 2,000,000 cu. yds. excav.	Bd. of State Engrs., New Orleans Court Bldg., New Orleans.

STREETS AND ROADS

Greenville, Ala.—Co. Comrs. of Butler County decided to construct the Greenville-Georgiana road.

Bentonville, Ark.—According to plans of the Bentonville Community Club, the six main roads leading into the town are to be improved for a distance of 12 miles. It is planned to raise \$6,000 for the work, which will be done in co-operation with all the good roads organizations in the territory.

Little Rock, Ark.—City council directed the city attorney to prepare a petition requesting the legislature to make an appropriation for the paving of Seventh St. from Cove to Wolfe, and to construct sidewalks on the north side of the state capitol on Markham St. and on Markham St. on the south side of the State School for the Deaf, from Barton to May St.

Little Rock, Ark.—Bids received Feb. 6, at 2 p. m., by City Clerk P. H. Machin for \$52,000 street improvement bonds for District No. 6.

Berkeley, Cal.—City council has instructed the city engineer to prepare plans, specifications and estimates for the improvement of Ashby Ave. from Claremont Ave. to Domingo Ave., Tunnel Rd. and Domingo Ave.

Los Angeles, Cal.—Engineer instructed to establish curb lines on Nolden St. from Hib St. to Irvington Pl. in connection with the improvement of Irvington Pl. from Aldama St. to Ave. 56.

Los Angeles, Cal.—City will receive bids for the following street improvement bonds, up to the 8th day of February, 1917, 11 a. m.: 31 bonds for the improvement of Clifton St. from the produced northeasterly line of Montecito St. to a line 11 ft. northeasterly from the northeasterly line of Hillside Dr., amounting to \$3,666.73. N. T. Powell, Treas. J. McPherrin, Chief Deputy.

Palo Alto, Cal.—Palo Alto will have a plaza 300 ft. wide and entirely surrounded by an arcade if the plans of the city planning commission are carried out. City Planning Expert Charles H. Cheney presented an outline of the plaza as planned by him. The commission will recommend to the city council that detailed plans for the entrance be made as soon as possible.

Pomono, Cal.—City plans to pave the block on W. Alvarado St., between Garey and Park Aves.

San Diego, Cal.—City Engineer Cromwell announced plans and specifications for paving Prospect St., La Jolla, will be ready for action at next meeting of council. This is to be a link of the pavement extending north to connect with the state highway, which ends at Torrey Pines.

Visalia, Cal.—Tulare County may issue \$2,000,000 in bonds to build about 200 miles of permanent highways. The plan as tentatively arranged calls for a main line artery through county from Dinuba and the county line via Visalia, Exeter, Lindsay, Porterville and Terra Bella to Richgrove and the Kern County line. It calls also for a paved road east from Visalia through Exeter, Woodlake and Lemon Cove to Three Rivers, the artery into Giant Forest and Kern River Canyon. Another road would be built from Tulare west and south to Waukena and another connecting Tulare with the state highway lateral between Visalia and Hanford, running directly down the Southern Pacific, a feature promised the state highway commission.

Bridgeport, Conn.—See "Sewerage."

Danbury, Conn.—City will probably improve certain portions of the granite block pavement on Main St. with cement or a new pavement during the year.

Washington, D. C.—Apportionment of \$10,000,000 to aid the states in the construction of rural post roads, the second annual distribution in accordance with the federal aid road law, was announced by Secretary Houston of the department of agriculture. The funds are for the fiscal year ending June 30, 1918. In addition \$1,000,000 will be apportioned for the development of roads and trails within or partly within the national forests. The law provides that \$15,000,000 shall be apportioned in the fiscal year of 1919, \$20,000,000 in 1920, and \$25,000,000 in 1921.

Jacksonville, Fla.—Committees are being appointed by all organizations in the city to devise means and ways of securing a hard surfaced road from Jacksonville to the new bridge over the St. Marys River.

Jacksonville, Fla.—Board of Bond Trustees for \$125,000 paving bonds will receive bids Feb. 20.

Winter Haven, Fla.—Citizens voted \$325,000 bond issue for construction of 47½ miles of sheet asphalt highways in the Winter Haven Twp., which covers an area of six miles square.

Boise, Ida.—The State Highway Commission, after a conference with the road and bridge committees of the legislature and Lawrence I. Hewes, of Portland, Ore., designated agent of the government, to arrange for the disbursement of rural post road funds in the state of Idaho, Oregon and Washington, decided to reduce its request to the legislature for highway funds to a flat \$1,000,000 instead of \$1,500,000. A bill is now being drafted for introduction into the legislature showing the distribution of this fund.

Lewiston, Ida.—The Lapwai valley highway district sold bonds in the sum of \$150,000, bearing 5 per cent interest, at a premium of \$3,135, for construction of the highway connecting north and south Idaho.

Freeport, Ill.—Board of local improvements will consider reconstruction of Lincoln Ave. and opening up Cherry St. through to Broadway. A request has been made that the north end of Adams St. be paved with brick.

Golden, Ill.—Adams County Golden Rule Good Roads Association favors the township plan of road building in the county. A committee will work out good roads plan and present it to the board of supervisors for consideration at their March meeting.

Herrin, Ill.—Construction of 2 miles of streets with concrete considered this year by city. R. Ladams, City Engr.

West Frankfort, Ill.—City may award contracts in March for paving with concrete number of streets. P. B. Wilson, Engr., Marion, Ill.

Columbia, Ind.—Whitley county highway bonds awarded as follows: \$4,507.80 and \$8,140.60 to the Meyer-Kiser Bank, Indianapolis, for \$492.10 premium; \$12,156 to the Union Trust Co., Indianapolis, for \$456 premium; \$12,820, \$9,000 and \$5,366 to the Meyer-Kiser Bank, Indianapolis, for \$1,084.97 premium. Other bidders were J. F. Wild & Co., Fletcher American National Bank, Breed, Elliott & Harrison, the R. L. Dollings Co. and State Savings & Trust Co., all of Indianapolis. Bonds bear 4½ per cent. interest and cover a period of 10 years.

Huntington, Ind.—George E. Sprinkle, county superintendent of roads, favors the construction of permanent brick roads as feeders for Huntington in case a highway commission is created by the legislature and the counties gets state and federal aid for the construction of such roads. He suggests building brick roads in the following order: From Warren to Huntington, and thence out the Goshen road to the county line. From Huntington through Roanoke over the Fort Wayne road to the Allen county line, and from Huntington to the county line over the Mt. Etna road. A road through Andrews to the Wabash county line. A possible sixth spur would be over the Bluffton road to Markle, which is on the Wells county line.

Indianapolis, Ind.—Resolutions adopted: 25th St. from Fall Creek to Boulevard Pl., cement walks and curb; Webster Ave. from Washington to Julian, curb; Hanson Ave. from Vermont to Michigan, curb; Harlan St., east side, from Lexington to Woodlawn, cement walks and curb; Iowa St. from Union to Madison, cement walks and curb; First alley northeast of Samoa St. from First alley northwest of Covner to Second alley northwest; Second alley northwest of Covner, from Samoa to Jefferson, grade and gravel; Dawson St. from Lexington to Woodlawn, cement walks and curb; First alley east of Delaware, from Carson to Adler, grade and gravel; Hanson Ave. from Vermont to Michigan, cement walks; Webster Ave., west side, from Washington to Julian, cement walks; Adelaide St. from Ohio to New York, permanent improvement; Calvelage St. from Germania to King Ave., cement walks and curb; First alley northwest of Covner, from Samoa to Jefferson, grade and gravel.

Kentland, Ind.—Bids will be received by Co. Comrs. of Newton County, until 2 p. m., Feb. 5, for construction of a macadam road in Beaver Twp. S. R. Sizelove, Co. Aud.

Lebanon, Ind.—Bids received Feb. 6, 1917, at 10 a. m., by treasurer of Boone county, for sale \$28,000 highway im-

provement bonds, 4½ per cent., ten years. Nelson J. Parr, Treasurer.

Peru, Ind.—Board of county commissioners adopted plans and specifications for a concrete roadway 22 ft. in width for the improvement of East Eighth St. from Tippecanoe St. to Water St., across the Wabash Railroad to Ninth St., thence east to Benton St. and Chili Ave. to the Prairie school house about one mile north of Oakdale.

South Bend, Ind.—A \$4,000 issue of St. Joseph county road bonds were sold to the Dollings Co., Indianapolis, at a premium of \$97.50.

Terre Haute, Ind.—Bids received Feb. 6, 1917, at 10 a. m., by treasurer of Vigo county, for sale \$7,300 highway improvement bonds, 4 per cent., ten years. Everett E. Messick, Treasurer.

Terre Haute, Ind.—City to improve Third St. from the south property line of Poplar St. to the north property line of Voorhees St., by grading and paving the roadway with asphalt, asphaltic concrete, wooden blocks, or brick laid on a 5-inch concrete foundation from curb line to curb line, to a uniform width of 59 ft., including curbing.

Terre Haute, Ind.—Sale of bonds of the McDowell road in Pierson township by County Treasurer E. E. Messick to Breed, Elliott & Harrison, of Indianapolis, was made for a consideration of \$4,500. The Indianapolis bond house paid a \$35 premium on the bonds.

Terre Haute, Ind.—The park board is preparing plans for the building of a boulevard on Ohio St., extending from 19th to 25th Sts.

Terre Haute, Ind.—City's neighbors on the Prairie Road, appeal before the good roads committee of the Chamber of Commerce for improvement of a bad road separating them from the city.

Warsaw, Ind.—F. Wild & Co., Indianapolis, successful bidder for \$14,000 to take care of floated warrants, premium of \$290; Jacob D. Huffer, \$4,000 bonds for paving parts of Buffalo, Market, Hickory, Scott and Detroit Sts., premium \$124.

Winchester, Ind.—Bids received Feb. 6, 1917, at 11 a. m., by treasurer of Randolph county, for sale \$68,500 highway improvement bonds, 4½ per cent., ten years. Elijah Puckett, Treasurer.

Denison, Ia.—First National Bank of Charter Oak, successful bidder for Crawford county \$153,000 bonds.

Des Moines, Ia.—City council plans to make improvements by paving with No. 1 vitrified paving brick, having a Portland cement filler, upon 6 ins. of Portland cement concrete foundation: Vine St., from the asphalt pavement in place at First St. to the brick pavement in place at Second St., and from the brick pavement in place at Second St. to the brick pavement in place at Third St., also West Third St. from the north line of Market St. going east to the south line of Vine St.

Des Moines, Ia.—City council to make improvements by paving with either sheet asphalt, consisting of 1½-in. wearing surface, 1½-in. closed binder course, or Warren Brothers' bitulithic, consisting of a 2-in. wearing surface, for one or more materials above specified to be placed upon 6 ins. of Portland cement concrete foundation: East First St. from the C. B. & Q. Railway tracks to the pavement in place at Court Ave., also Court Ave. from the east line of East Sixth St. to the west line of Capital extension.

Keokuk, Ia.—Along with other improvements contemplated for this year, the city council expects to order in a number of new cement sidewalks.

Marshalltown, Ia.—Property owners along W. Nevada St. want it paved if the third ward extension of the street car line is built in the street.

Marshalltown, Ia.—City council petitioned for the paving of Marion and S. 3d Sts.

Marshalltown, Ia.—A petition is being circulated for pavement for West Main St.

Marshalltown, Ia.—City petitioned by property owners along S. 3d St. from Church to Nevada St., that their street be paved with concrete.

Waterloo, Ia.—City Council adopted resolution for approximately ten miles of paving. Bids will be asked on the following forms of pavement: Cressed wood block with 5-in. Portland cement concrete base and 1-in. sand cushion; brick block pavement with 4 or 5-in. Portland cement concrete base and 1-in. sand cushion and cement grout or asphalt filler; sheet asphalt pavement with

2-in. wearing surface and 1-in. binder course and 6-in. Portland cement concrete base; sheet asphalt pavement with 1½-in. wearing surface and 1-in. binder course and 4 or 5-in. Portland cement concrete base; asphaltic concrete pavement with 2-in. wearing surface and 4 or 5-in. Portland cement concrete base; concrete pavement with 5-in. Portland cement concrete base and 2-in. Portland cement concrete wearing surface with and without steel reinforcement; concrete pavement, one mixture throughout, 6 ins. in thickness with and without steel reinforcement; Tarvia pavement with 6-in. macadam base and 2½-in. wearing surface; bituminous macadam pavement with 6-in. macadam base and 2½-in. wearing surface; plain macadam pavement 8 ins. thick; that portion of the street lying between railway tracks to be paved with repressed vitrified brick block with asphalt filler, laid on a 12-in. concrete base with a 1½-in. sand cushion.

Hutchinson, Kan.—County commissioners decided to have two miles of the county road just east of Haven graveled.

La Grange, Ky.—Road bonds for \$50,000 will be sold March 2. Address City Council.

Pine Knot, Ky.—Reported city will vote on \$30,000 bond issue for street improvements and for constructing steel bridges on outskirts of town.

Islip, L. I.—Village will vote April 3 on a proposition for raising \$30,000 for sidewalk construction.

Southampton, L. I.—The proposition to bond the town for \$50,000 for the purpose of repaving Main St. and Job's lane, in this village, with warrenite, carried at a special election.

Arcadia, La.—An election will be held to issue \$65,000 Ward 2 road bonds on Feb. 1.

Kenner, La.—The town council will adopt an ordinance providing for the sales of a franchise for a municipal lighting system. The grant also carried with it the privilege to do a commercial business, and it is understood the Orleans-Kenner Electric Railway Co. will make a bid therefor. About ten blocks of good roads will be built through the town, extending along the O.-K. line as a continuation of the road in the first good roads district.

Lauderdale, La.—Secretary Police Jury F. M. Bertant, Feb. 20, at 11 a. m., receiving bids for road improvement bonds amounting to \$200,000.

Attleboro, Mass.—A delegation of Taunton city officials headed by Mayor J. William Flood appeared before the state highway commission in Boston to confer with the state authorities on the proposed completion of the state highway between Norton and Taunton. A hearing will be given Jan. 29 at the State House on Rep. Worrall's bid for a \$20,000 extension.

Brockton, Mass.—A \$10,000 loan order introduced to council for permanent road construction in North Montello St.; also \$15,000 for permanent road in Plain St., from the present terminus to the East Bridgewater line, were referred to finance committee.

Dracut, Mass.—Town warrant which will be acted upon at the annual meeting appropriation of \$2,000 for the macadamizing of Lakeview Ave. from Mammoth road to Canney's corner; \$3,500 for the macadamizing of the Nashua road from Richardson's corner to Canney's corner; \$2,000 to reconstruct and build a part of Pleasant St., between Hovey square and Swain; \$2,000 for the purpose of installing a water system in the Collinsville school. The fire department article for the appropriation of \$2,500 for the purchase of a chemical engine; also for the construction of sidewalks.

Fitchburg, Mass.—Public works committee favors immediate action taken in extending Kimball St. in accordance with a plan suggested by Commissioner Guy H. Chase, of the department of streets, and engineering committee will bring the question to the attention of the city council at an early date.

Pittsfield, Mass.—Mayor William C. Moulton has received budget estimates. The appropriations listed as much needed follow: Highways, \$60,000; Buffalo-Pitts maintenance roller, \$4,500; water works maintenance, \$21,000; sewer connections, \$2,500; water connections, \$2,500; sidewalk maintenance, \$5,500; bridge repairs, \$3,300; city hall, light, heat and care, \$2,800; crosswalk maintenance, \$2,700; general expense, \$2,500; repair and care sewers, \$3,800; repair of buildings, \$2,000; sewage disposal, \$21,000; street

sprinkling, city property, \$450; street cleaning, \$7,700; catch basin cleaning, \$3,500; street signs, \$500; municipal yard maintenance, \$1,000; municipal stables, \$600; pavement repairs, \$8,000; maintenance of motor vehicles, \$5,000; new crosswalks, \$800. The special appropriations desired if the city can afford the same follow: Melville St. drain, \$1,600; Melville St. paving (under 1916 paving act), \$11,000; Renne Ave. drain, \$900; Renne

sions, \$10,000; Mill St. paving (1916 paving act), W. Hous. to and incl. bridge, \$9,000; Mill St. drain, \$800; Hurlbert St. paving (under 1916 paving act), \$4,200; Hurlbert St. and South Church St. drain, \$800; West Housatonic St. (Pomeroy curve) and grading, \$1,800; South St. widening (Howard Hill), \$1,650; Francis Ave. drain (Summer to Bradford St.), \$2,500; total, \$102,550.

Benton Harbor, Mich.—To bond Berrien county for \$1,000,000 for good roads is a scheme launched by taxpayers of Bainbridge township in connection with their vote for a special election for \$70,000 for local road improvement. Three other townships of the county have similar plans for individual solution of the good roads problem.

Detroit, Mich.—Council will readvertise for bids for bank sand, bank gravel and river sand and river gravel.

Detroit, Mich.—Delivery of the \$200,000 road bond money was made by the Detroit Trust Co. to County Treasurer A. C. Proper. The premium on sale of the bonds amounted to \$2,330 and accrued interest of \$1,175. Work on many of the roads to be reconstructed with the bond money will probably begin at once.

Menominee, Mich.—Pavement of the bridge leading from Menominee to Dunlap Sq. with cedar blocks became a certainty. The Marinette city council authorized the board of public works to work in conjunction with the bridge committee of the Menominee council.

Pontiac, Mich.—City Engineer W. J. Fisher estimate on 13 paving propositions to be completed during the season. Objections will be heard Feb. 13. The estimates based on brick are as follows: Judson St. from Saginaw to Parke, \$4,036.93; Sanderson Ave. from Willow to Oakland, \$10,202.06; Mt. Clements St. from Douglas to city limits, \$55,819.68; North Saginaw from Howrad to Chamberlain, \$7,047.37; Hartung court, \$3,010.08; Osmun St. from Saginaw to Paddock, \$14,788.35; Oak St. from Huron to Washington and Washington from Oak to State Ave., \$10,444.85; Matthews from Saginaw to Edison, \$6,391.98; Parke from Huron to Auburn, \$17,173.32; Whittemore from Saginaw to Parke, \$3,459.75; Baldwin Ave. from Oakland to city limits, \$41,781.15; and Willow Ave. from Huron to Sanderson, \$18,841.51. Estimates were also given on asphaltic concrete and concrete, both of which run less than brick.

Pontiac, Mich.—Pontiac, Mich., was the successful bidder for the \$25,000 road bonds of the 1918 and 1919 county road series at a premium of \$25.

Minneapolis, Minn.—Bond issues aggregating a million and a half dollars were recommended for authorization by the city council, for paving, curb and gutter improvements, \$100,000; sewers, \$500,000; fire department, \$100,000; bridge improvements and extensions, \$100,000.

St. Louis, Mo.—See "Sewerage."

Camden, N. J.—Highway department will early in the spring lay 91,000 sq. yds. of asphalt streets which city council has passed an ordinance for. Market, Federal, Broadway and other highways will be improved. The highway department is advertising for three 6-ton motor trucks for hauling asphalt from the city plant to the street operations.

Duluth, Minn.—Judge Foster signed an order establishing a new judicial highway between St. Louis and Koochiching Counties, beginning at the Nett Lake Indian Reservation and running south for 8½ miles. The new highway will open up the country to the towns of Cook and Gheen.

Duluth, Minn.—City commissioners plan to make only one large improvement this year. This one will be the grading of the roadway for the Kenwood street car extension at a cost of about \$7,000 to the city. The remainder, about \$10,000, will be paid by the property owners.

St. Cloud, Minn.—City commissioners passed a resolution instructing the city engineer to prepare plans and specifications for the paving of Fifth Ave. from 2d St. south to 7th St. S., and part of 4th Ave. N. between St. Germain St. and Fifth Ave.

St. Paul, Minn.—City council ordered old brick to resurface E. 7th St. between the Great Northern Ry. bridge and Hope St.

St. Paul, Minn.—City will pave Grand Ave. between Oakland Ave. and Milton St. with creosoted blocks, but the present macadam surface will remain through 1917. The cost is estimated at \$40,518, or \$5.56 a front foot.

St. Cloud, Minn.—City engineer instructed to prepare plans and specifica-

Talking About Contract News

You who have been using these pages in the past and know the value of the service, will be interested in these figures showing Contract News Items published last month.

	Streets and Roads	Sewerage	Water Supply
M. J.	869	303	268
1	620	210	218
2	516	187	167
3	295	104	124

But we are not satisfied just to be better than the other fellow. We believe in giving you the best and fullest Contract News, in making our service more valuable each month.

Here's how we have succeeded during the past year:

In January, 1916
MUNICIPAL JOURNAL
led the field—as usual—with

969

Advance News Items on
Streets and Roads
Sewerage
Water Supply

In January, 1917
MUNICIPAL JOURNAL
led the field—as usual—with

1540

Advance News Items on
Streets and Roads
Sewerage
Water Supply

Ave. paving (under 1916 paving act), \$3,200; Malcolm Ave. repair, Pollock to Stratford Ave., \$3,700; Walnut St. repairs, \$3,100; Linden St. extension repairs, \$1,500; South Ave. repairs, \$700; Abbott St. repairs, \$3,100; Longview Terrace repairs, \$1,500; 18-in. water pipe extension, Mill Brook, to complete, \$12,000; Hubbard Ave. bridge, \$11,500; ordinary water extensions, \$15,000; ordinary sewer exten-

tions for 11,000 sq. yds. of paving on 5th Ave. No type of pavement specified. C. H. West, consulting engr.

Hazlehurst, Miss.—Bids received Feb. 5 at 2 p. m., by County Clerk J. C. Smith for Road District No. 5 bonds for \$8,500.

Waynesboro, Miss.—County treasurer received \$25,000 from the recent sale of additional good roads bonds and work will begin on the public roads as soon as the weather will permit.

St. Joseph, Mo.—Ed. of Pub. Wks. plans to pave portion Shady Ave. with cement.

Great Falls, Mont.—Commissioners present from every county indorsed the plan to improve the highway leading from Red Lodge by way of Billings, Roundup, Lewistown, Great Falls, Choteau and Shelby to Glacier National Park. The road would come into Montana from Wyoming at Chance pass and when it is improved it will be known as "Empire Highway."

Rochester, N. H.—The petition to straighten and widen Walnut St. and draw the side lines and construct a sidewalk from Strafford square to the Ray S. Chadbourne estate was referred to the committee on roads, bridges and drains.

Bayonne, N. J.—Board of commissioners granted petition for improvement of W. 19th St. from Ave. A to Newark Bay. New concrete sidewalk 4½ ft. wide to be laid on each sidewalk. New blue-stone curb set in concrete to be set on each curb line. The entire width of the roadway to be paved with sheet asphalt on a 5-in. concrete base.

Bayonne, N. J.—Ordinance passed for the improvement of W. 29th St., from Ave. B to Broadway. New concrete sidewalk 4 ft. wide to be laid on each sidewalk. Old sidewalk to be adjusted or relaid or replaced. New concrete curb and gutter to be set on each curb line. Old curb and gutter to be adjusted or reset or replaced. The entire width of the roadway, from gutter to gutter, to be paved with sheet asphalt on a 5-in. concrete base. Wm. P. Lee, city clerk.

Bayonne, N. J.—Ordinance passed to change the grade of Newman Ave. between W. 5th Ave. and W. 6th St. Wm. P. Lee, city clerk.

Hammonton, N. J.—State Highway Dept., Trenton, completing details for constructing proposed concrete highway at this place. J. C. Remington, Jr., Town Engineer.

Newark, N. J.—The following streets to be improved: Mt. Pleasant Ave. to be paved with wood block from Clay St. to 4th Ave., and from the latter thoroughfare to Harvey St. with asphalt; 4th Ave. from 5th St. to Roosevelt Ave., will be paved with old brick. Other streets will be paved as follows: S. 16th St., telford; Lewis St., granite; Summer Ave. from 8th Ave. to Bloomfield Ave., granite; Oration St. from Hinsdale Pl. to Chester Ave., brick.

Newark, N. J.—It was tentatively agreed to pave the following streets with asphalt: Mapes Pl., Huntington Terrace, Renner Ave., Chadwick Ave., Lehigh Ave., Osborne Terrace, Moen Pl., Nye Ave., Lyons Ave., Edwin Pl., Rock Ave., Richards St., Lexington St., Providence St., Cortlandt Pl., N. 6th St., N. 7th St., N. 10th St. and Woodside Ave.

Trenton, N. J.—Senator James Hammond introduced a bill in the upper branch of the legislature to permit city to change the grade of Calhoun St. without the consent of abutting property owners.

Trenton, N. J.—Commissioner Fell will ask approval of the Commission for the paving of several streets and repair of others this season. It is now proposed to expend about \$30,000 instead of \$10,000 as originally mentioned.

Trenton, N. J.—To carry out plan for the construction of the Trenton House Hotel it will be necessary for the city to arrange for the widening of East Hanover St. Hotel owners would like to see it made 60 ft. thoroughfare for the entire distance.

Trenton, N. J.—Residents of the western section of the city will benefit by the carrying out of the paving program recently announced by the City Commission. Elmhurst Ave. between Stuyvesant and Bellevue Ave., will be done during the spring and summer, as will also parkside Ave. from Stuyvesant Ave. to Oak Lane. The West State St. pavement, which terminates at Parkside Ave., will be continued to a point where Sanhickan Drive and Sullivan Way join, giving a complete stretch of paved road from the city line in Wilbur to that point. North Trenton by the paving of Pennington Ave. from Frazer St. to Prospect St. Close to \$25,000 will be spent in

the western section and \$12,000 in North Trenton paving projects.

Carlsbad, N. Mex.—March 17 an election will be held to issue \$100,000 road bonds.

Camden, N. Y.—Village votes to combine with state and build bitulithic pavement. Paving will begin at the bridge over the Mad River on the east side of the village through Church St. to Main, down Main to Mexico and over Mexico to the corporation line on the west side, connecting with the state road going out of the village on the west side. The state has agreed to build a road over this distance, but it will be only 16 ft. in width.

Fairport, N. Y.—Bids received Feb. 23 at 7 p. m., by Village Treasurer Geo. G. Mulliner for \$21,000 street paving bonds.

Irrington, N. Y.—Continuous pavement for Broadway from the Battery to the northern line of Irrington, a distance of 27 miles, was assured when the taxpayers voted to spend \$136,000 to pave that street for the two miles it runs through the town. It is expected that within a few months Tarrytown will decide to pave its section of Broadway. Then there will be a 40-mile stretch of paved road running north from the Battery.

Olean, N. Y.—Assemblyman Ames introduced two bills legalizing the proceedings of the mayor and common council of Olean, increasing the width of the pavement on East State St. and in improving that street and authorizing bond issues.

Lillington, N. C.—For road bonds amounting to \$15,000, Feb. 12, noon, Attorney for Road Commissioners J. R. Baggett will receive sealed bids.

Taylorsville, N. C.—About \$150,000 available for construction of roads in Alexander County. For further information address County Clerk.

Andover, O.—Bids received Feb. 14 for paving bonds, North Main St., \$1,023.01; Public Square, \$6,986.96. Village Clerk, R. R. Ellis.

Ashtabula, O.—County commissioners have agreed to pave the county's share of Runkle St. with a 20-ft. pavement instead of 16 ft., as originally planned, providing the property owners will pay for the paving of four extra ft. to make the pavement full 24 ft., which will be the same width as the portion within the city limits.

Bowling Green, O.—Ohio National Bank, Columbus, O., successful bidder on the \$6,000 Wood County 5 per cent road bonds, at par, premium of \$137.50 and accrued interest. Seasongood & Mayer, Cincinnati, O., \$122; Durfee, Niles & Co., Toledo, \$116; The Tillotson & Wolcott Co., Cleveland, \$137.40; The Provident Savings Bank & Trust Co., Cincinnati, \$137.40; The Wood County Savings Bank Co., Bowling Green, \$120.

Canton, O.—County Highway Superintendent Sickafoose will urge the state highway commissioner to construct a monolithic pavement on Osnaburg-New Franklin and the New Franklin-Minerva highways this year.

Canton, O.—City Engineer Sarner gives estimates to the council for building a sanitary sewer in 8th St. N. E., from Belden Ave. to the corporation line, at \$12,210; of paving Shorb Ave., N. E., between 12th and 18th Sts., \$34,025; paving 3d St., N. W., from McKinley Ave. to Newton Ave., \$27,673; improving 3d St., N. W., from Harrison Ave. to Fawcett Court, \$11,630, and improving Arlington Ave., S. W., between 7th and 12th Sts., \$11,632.

Canton, O.—Resolution was adopted to have concrete or stone sidewalks laid in front of properties on the north side of 15th St., S. E., between the B. & O. Railroad and Allen Ave., S. E.

Canton, O.—Resolutions providing for the paving and improvement of about 3 miles of Stark county roads this summer were passed by the county commissioners and the work is to be started as soon as the necessary hearings can be held and the legislation and advertising for bids attended. The entire cost of the work is expected to be about \$150,000, to improve the following roads with brick: Canton-Canal Fulton road, from Canton city limits at 18th St., N. W., to a point about 1½ miles northwest of the city; Canton-Middlebranch road, from city limits north of county workhouse, 1½ miles north toward Middlebranch. Some surveys completed. Two miles on the road from New Baltimore, in Marlboro township, extending south toward "Death Curve" on the Canton-Louisville Alliance road, to be paved with macadam. Alliance-Limaville road in Lexington

township for 3 miles with macadam. Extension of Louisville-Freeburg road from Yeagley's Corners in Washington township, east to the Columbia county line, about ¾ of a mile to be paved with brick. This list includes only a part of the road work which will be done during 1917.

Cincinnati, O.—A resolution declaring it necessary to improve Freeman Ave. from north line of Kenner St. to Central Ave., by paving with granite.

Cleveland, O.—County Engr. W. A. Stinchcomb has prepared estimates for improving roads in Euclid, Mayfield and Orange townships. Address E. C. Krause, County Clerk.

Cleveland, O.—Mayor Davis instructed City Engineer Hoffmann to prepare for the council a complete report on the paving program to be accomplished by the city with its \$3,000,000 bond issue.

Coshocton, O.—County plans spending \$40,000 for road improvements this summer. The Coshocton-West Lafayette Road and the Warsaw-Coshocton Road are mentioned for improvements. Contracts will be let in February by the state highway department.

Cincinnati, O.—See "Miscellaneous." **Cincinnati, O.**—An estimate of \$6,045 for the improvement of the Adams road through the county was submitted by the surveyor. The cost of improving the road through the village of Mt. Healthy \$3,822.

Findlay, O.—See "Sewerage." **Fremont, O.**—Petitions are being circulated for paving of Birchard Ave. with asphalt.

Gallion, O.—Bids are going to be received by C. F. Else, clerk of board of trustees, Gallion, O., for \$18,000 worth of roads. A. F. Unckrich, Director of Pub. Service.

Lima, O.—City council authorized improvements for the pavement of nearly three miles of streets and includes Baxter St., Wayne to Delphos Ave.; Grand Ave., West to Metcalf; Jameson Ave., Hazel Ave. to Elida Rd.; Leland Ave., Charles St. to Jameson Ave.; Metcalf St., North St. to Brice Ave.; Metcalf St., Market to North St.; Madison Ave., Franklin St. to Vine St.; Pierce St., North St. to Pennsylvania R. R.; Scott St., Elm to Kibby St.; Vine St., Main to Metcalf St. The four alleys are Buckeye alley, from Public Square to Union St.; Court alley, from North St. to first alley north of Wayne St.; Baker alley, from Elizabeth St. to Main St., and Walnut alley, from Spring to Market St.

Marion, O.—Counties to issue bonds for the Weldemaier joint county road improvement: Crawford, \$11,000; Marion, \$17,000. Bonds may be offered for sale about the middle of February.

Marysville, O.—Officers and members of Richwood chamber of commerce request county commissioners that steps be taken as soon as practicable toward affording improved road conditions between Richwood and Marysville.

Massillon, O.—The city during the coming year will pave Canal St., between Tremont and Walnut Sts., and property owned by the state abuts on the east side of the street. According to estimates furnished by City Engineer Yost, the state's share of the paving would be nearly \$7,000.

Middletown, O.—Specifications for the paving of levee road in this city are being sent to various contractors by County Engineer Fred Hammerle. Road, which connects Middletown and West Middletown, is 3,300 ft. in length. As the new viaduct is part of this road it is included in the specifications. Brick is to be used for all paving around the city if the residents have any influence. Work will be started in the spring.

Rockford, O.—Village Clerk C. C. Pixler is receiving bids Feb. 16 for improvement bonds for Pearl St., \$4,173.75; St. Marys and Fort Wayne road, \$3,848.28.

Springfield, O.—City Engineer M. J. Bakin in his annual report recommends that Buck Creek be straightened from Main St. to Mad River. The separation of grade crossings be constructed. Sewage disposal plant be constructed. That railroad crossings have proper construction.

Toledo, O.—State highway department announced that it had prepared a budget for submission to the General Assembly which called for \$24,850,000 for two years. Six million dollars a year for state highway construction, \$12,000,000. One million five hundred thousand dollars a year for state aid construction and maintenance, \$3,000,000. Two hundred and fifty thousand dollars a year for the purchase of turnpikes and toll bridges, \$500,000; the local authorities.

in all cases, paying 50 per cent of the cost of freeing toll roads and bridges. Township road bonds deficiency for the years 1912-1913 and 1914, \$1,350,000. In addition to the above, also the necessary legislation to make available the automobile license fees for state highway maintenance \$3,000,000 a year, \$6,000,000. Total, \$24,850,000.

Troy, O.—For paving road from Troy Center to Hiramtown line a petition is being circulated to issue \$25,000 bonds.

Warren, O.—For roads in Brookfield and Hubbard townships, county sold \$7,000 bonds.

Zanesville, O.—State Highway Commissioner Clinton Cowen announces that he is ready, with the consent of the government, to assist Muskingum County with federal funds to the extent of about \$140,000 in the improvement of the East pike from this city to New Concord.

Sayre, Okla.—Sand clay road considered by Beekhaus county. Address county clerk, Sayre.

Portland, Ore.—County road department will soon start on this year's \$40,000 worth of grading, to be done on the St. Helens road. Bids will be advertised very shortly.

Salem, Ore.—Legislature passed a bill authorizing, if necessary, a bond issue of \$1,800,000 for road improvements in Oregon to match a similar sum which will be given by the national government dollar for dollar for road work. The expenditure is to be spread over a period of five years.

Erie, Pa.—Council petitioned to widen 25th St. from 25 to 60 ft. between Liberty and Poplar Sts.

Erie, Pa.—Following up the initial steps taken toward the building of an Erie-to-Pittsburgh road, to be known as the Perry highway, organization of the Erie-to-Pittsburgh Highway Association will take place in Pittsburgh.

Johnstown, Pa.—Civil engineers appointed by the Bedford County Court have completed their work of establishing the lines of the proposed highway between Somerset and Bedford counties, over the Allegheny Mountains. The grade of the new highway will not exceed 4.5 per cent, at any point, according to the engineers.

Titusville, Pa.—J. B. Pastorius, president of the Titusville Good Roads Committee, has forwarded to the state highway commission at Harrisburg a petition asking that the main street through Hydetown borough be paved with brick to a width of 16 feet.

Williamsport, Pa.—City council may pass legislation authorizing the highway department to make the necessary grading on West Fourth St. if the county commissioners will finance the construction of a bridge over Lycoming creek at that point.

Hohenwald, Tenn.—Feb. 15, \$100,000 road and bridge bonds will be sold. Address Ernest L. Sprinker, County Clk.

Center, Tex.—Bonds of \$12,000 issued to build roads voted by Shelby county.

San Antonio, Tex.—City and property owners reached an agreement for the widening of Soledad St. from Houston to Romana Sts.

Wharton, Tex.—Commissioners of Wharton and Colorado counties will, at an early date, undertake the improvement of the public road at East Bernard River, where the counties join.

Wichita Falls, Tex.—George D. Marshall, government road expert, who made a survey of the road situation in this county, has submitted a report to C. W. Reid. A road system of 107 miles, he estimates, can be permanently improved at a cost of \$705,000. Recommends bituminous macadam as the most suitable material, estimating the expense at \$4,000 to \$7,000 per mile.

Alexandria, Va.—Resolution introduced to common council in the budget \$10,000 for the construction of a 24-ft. macadam roadway from Stone Bridge on Duke St. to Fairfax St., a distance of 12 blocks, referred to committee on finance and streets. Other in the budget follow: \$2,700 for macadam roadway from Duke St. northeasterly to old dividing line of diagonal road in what was formerly Fairfax county; \$1,500 for similar roadway on diagonal road between old dividing line of Alexandria and Fairfax counties; \$400 for extension of sewer on Duke St. eastward from Fayette St.; \$1,000 for purchase of broken stone for road work during the coming season; \$1,000 to purchase asphalt; \$300 for catch basin at Washington and Gibbon Sts., and also to extend pipe sewer southward on Washington St. to a point within 30 ft. of

Franklin St.; resolution of Councilman Burke appropriating \$75 for cinder walk west of Hooft's run to connect with Russell road.

Alexandria, Va.—Resolution presented to the city council and referred to finance committee \$10,000 for tar macadam roadway on Duke St. from Stone Bridge to Fairfax St., distance of 12 blocks; \$2,700 for roadway on Duke St. northeasterly to old dividing line of diagonal road in Fairfax county; \$1,500 for roadway on diagonal road between boundary line of Alexandria and Fairfax counties; \$1,000 for purchase of broken stone for work during coming season; \$1,000 for purchase of asphalt; \$300 for catch basins, east side of Washington and Gibbon Sts., and also extension of sewer on Washington St. within 30 feet of Franklin St.; \$75 for cinder walk west of Hoff's Run, to connect with Russell Rd.; \$400 for sewer on Duke St. eastward from Fayette St.

Clintwood, Va.—The board of county commissioners of Dickinson County will soon let contract for constructing road between here and Freeling and repairing Main St. Estimated cost, \$60,000.

Norfolk, Va.—City manager plans for extensive street improvements. The work will be started the latter part of March or the first part of April.

Ceredo, W. Va.—Feb. 17 an election will be held to issue \$33,000 paving bonds.

Parkersburg, W. Va.—Property owners and residents of George St. presented a petition asking that the street be paved from Virginia Ave. to 12th St.

Parkersburg, W. Va.—Ordinances which provide for the paving of five additional streets in the city introduced to council: Market St. from Third to Eighth Sts., \$25,277; Juliana St. from Third to Eighth Sts., \$18,586; Depot St. from Harris to 650 ft. east, \$4,244.50; 12th St. from Ann St. to Murdoch Ave., \$1,976.50; Washington Ave. from Oak to Plum Sts., \$6,232.90.

Parkersburg, W. Va.—City calling for bids 22,004 sq. yds. brick paving, concrete base, with cement grout filler, about \$57,000. T. L. Higgs, city engr.

Asotin, Wash.—County Commissioner O. E. Bailey of Clarkstone has taken the initiative in the matter of improving highway conditions in the southern part of the county, and it is not improbable that his activity will result in the construction of a bridge across the Grand Ronde River at Hansen Ferry.

Friday Harbor, Wash.—Board of commissioners, San Juan County, John E. Whitely, clerk, will receive bids for construction of about 1 mile of road from Lopez Island, according to plans and specifications on file with county engineer.

Olympia, Wash.—City council passed resolution to pave W. 4th St. from Sylvester to Water St. and ordinance to build an 8-ft. sidewalk on Main from A to C Sts.

South Bend, Wash.—County Engineer S. B. Henry instructed by the commissioners of Pacific county to make a survey and prepare the plans for improvements of approximately 2 miles of road on the Menlo-South Fork.

Tacoma, Wash.—County board ordered to readvertise for bids on the proposed 11th St. fill that will provide a highway from Sitcum Ave. to the site of the Todd Shipbuilding & Drydock Co.'s property on the tideflats.

Cumberland, Wis.—Agitation has been started looking to having the main business street macadamized.

De Pere, Wis.—William St. hill between Broadway and Front Sts. will be paved with macadam next spring. Also likely that Front St. will be paved with asphaltic concrete from George St. to the Milwaukee Rd. station.

De Pere, Wis.—City may pave Grant St. and 8th St. in the summer.

Superior, Wis.—The following distribution of money for county roads during the coming year was recommended by the road and bridge committee and was accepted by the board for several towns: Lakeside—Lakeside Road, $\frac{1}{2}$ mile at Davidson's, to connect roads built, \$600; bridge over ravine, \$2,500; bridge over Amnicon River, \$4,000; total, \$7,100. Maple—Grading Maple Road from south line to sections 22 and 23 to north line of sections 14 and 15, \$4,000. Brule—Grading Ashland Road to east county line, \$2,500; bridge over Brule River, \$4,000; bridge over Little Brule, \$1,500; total, \$8,000. Amnicon—Poplar Road from Poplar to west line of section 5-47-11, \$2,500; bridge over Poplar River, \$1,000; graveling Grand Ave. from Bayfield to Omaha crossing, \$5,000; total,

\$8,500. Wascott—Totogettic Road, $2\frac{1}{2}$ miles, \$4,500. Superior—Bardon Ave., graveling from south line of section 36-48-14 to south line of section 12, \$5,000; western road grading, \$3,000; bridge over Nemadji River, \$5,000; Bardon Ave. graveling from north line of section 12 to south line of section 13-48-14, \$5,000; total, \$18,000. Summit—Bardon Ave. from Amnicon Lake to south line of section 26-46-14, \$4,500; Minnesota road grading, \$11,000; Braci River road graveling, \$5,000; total, \$10,500. Solon Springs—Newell Road from Solon Springs west, \$2,500; Central State Road graveling around hills, \$3,000; graveling from Molls to graveled hills, \$3,500; grading, \$1,000; total, \$10,000. Parkland—Spaulding Ave. macadamized from South Range to Stone's corner, \$1,000; Rossiter Ave. macadamize from South Shore to Soo crossings, \$3,000; total, \$4,000. South Range—Tourville road grading, \$1,800. Hawthorne—Hawthorne road graveling, \$2,500; Central road graveling, \$3,000; total, \$5,500. Highland—Highland Road grading, \$3,000. Gordon—Moose Road grading, \$7,000. Village of Lake Nebagamon—Nebagamon Road from Smiths to Lake Nebagamon, \$3,500. Total to be expended—\$95,000 in addition to \$20,000 bond issue for road from South Superior to Steel Plant.

Brantford, Ont.—The city council instructed City Engineer T. Harry Jones to prepare a report upon the approximate cost of paving Oxford St. from Burford St. to Lorne Bridge.

Exeter, Ont.—The town council plans to pave Main St. Clerk, Jos. Senior.

London, Ont.—At a cost of \$60,000, city council plans to construct asphalt pavements on Adelaide, Wellington and Richmond Sts. City Engineer, H. A. Brazier, City Hall.

London, Ont.—For laying of 30,000 sq. yds. of asphalt pavements tender will be called about Feb. 15. City Engr., H. A. Brazier.

Ottawa, Ont.—The widening of Somerset St., between Bell and Booth Sts., contemplated by board of control. Works Commissioner A. F. Macadam.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Fort Smith, Ark.—The *Cleveland Trinidad Paving Co., 886 The Arcade, Cleveland, O., for 9,553 sq. yds. asphaltic concrete on 4-in. concrete base and 8,979 lin. ft. 6-in. concrete curbing at \$12,499.

Bakersfield, Cal.—Bids opened Jan. 15, street paving, $1\frac{1}{2}$ -in. sheet asphalt, 13,000 sq. yds., including asphalt concrete foundation 4 ins. thick, *Thompson Bros., Fresno, \$1.134 paving per sq. yd., including grading, total \$16,948.50. Bidders: Federal Const. Co., Sharon Bldg., San Francisco, \$1.044 paving per sq. yd., including grading, total \$17,478.17; Worswick Paving Co., Fresno, \$1.08 paving per sq. yd., including grading, total \$18,053.04; Cal. Road Imp. Co., San Francisco, \$1.17 paving per sq. yd., including grading, total \$18,402.81.

Fresno, Cal.—Board of trustees, to *Thompson Bros., alley in block numbered 87, graded, curbed with redwood curbing and paved with a 4-in. cement concrete base, and $1\frac{1}{2}$ -in. bitulithic wearing surface. Grading, 2c per sq. ft. Paving, 14.9-10c per sq. ft. Curb, 16c per lin. ft.

Manhattan Beach, Cal.—The board of trustees received bids for the improvement of the Strand, Jan. 17. Estimated cost, \$60,000; 27 blocks in length; 15-ft. promenade; lighting system; 13 flights of stairways; 6,000 ft. of vitrified clay pipe; ornamental balustrade, etc. After opening and report of engineer, referred for further investigation and recommendation to M. M. Murray, city engineer.

Norwick, Conn.—For the construction of about 5,620 lin. ft. of graded road (overhead) on the Hartford-Willimantic turnpike in Bolton, *L. C. Fay Construction Co., of Springfield, for \$48,000. The following bids received: C. W. Blakeslee & Sons, New Haven, \$49,459; F. Arigoni & Bro. Construction Co., \$54,282.85; Middletown, \$51,671.90; Hyde Park, L. Suzio Construction Co., Meriden, \$56,478.50; Long Bros., Hartford, \$63,513.

Park Ridge, Ill.—*Standard Paving Co., 145 La Salle St., Chicago, Ill., for laying asphaltic concrete pavement on Center and other streets, at \$13,155.

Auburn, Ind.—*A. H. Frey, of Bluffton, Ind., will construct a gravel road for Franklin township, DeKalb county, at a cost of \$39,200.

Connersville, Ind.—For construction of a gravel road in Harrison township,

Fayette county, to *Connor & Sherry, of Connorsville, for \$18,449.

Freeport, Ind.—City council has already passed an ordinance authorizing the improvement of Chestnut, Pine and American Sts. with tar and macadam; estimate, \$11,747. Burchard Ave. with brick, \$7,413. Shaffer Ave., Elizabeth and Edwards Sts., tar and macadam; \$12,000. Contract awarded *Gund Graham Co., at \$9,938.90.

Indianapolis, Ind.—The Marion county commissioners, for a free gravel road in Center township, to *Burke Bros. Co., Anderson, Ind., \$24,394.

Indianapolis, Ind.—*C. M. Dale, La Fayette, Ind., \$15,400, concrete road, Marion County.

Algonk, Ia.—J. S. McLaughlin & Sons, Red Oak, Ia., for 42,532.4 sq. yds. of asphaltic concrete pavement and 1,298 sq. yds. of concrete alley pavement.

Barbourville, Ky.—The Fiscal Court of Knox county has let all remaining contracts for road building as follows: Portions of Dixie Highway from Barbourville to Corbin, to *Turner & Mason, the Dixie Highway from Barbourville to Bell county, to *T. J. Vermillion, a 4-mile branch extending up Stinking Creek, to *S. T. Jackson, 6 miles to Indian Creek to *T. J. Vermillion.

Lake Charles, La.—Commission council opened bids on 18,000 yds. of street paving covering Miller Ave. from Ryan and South Sts. east to Hodges St.; Kirkman St., between Kirby and Clarence Sts.; Reid St., between Clement and Division Sts.; South Division St., between Kirkman and the Boulevard; and North Ryan St. from the railroad to the north line of the ice plant. Bids of two contractors were received, Ritchie Bros., Lake Charles, La., and DeJersey & Naff. Each bidder covered the entire area to be paved, the former, however, bidding only on brick, while the latter concern submitted bids for brick, vibrolithic and concrete. Award will be made shortly.

Manistee, Mich.—County road commissioners for road work to *John Nelson for graveling roads in section No. 16, Eastlake, and *Gust. Domer for graveling the roads in section No. 23, main line.

Duluth, Minn.—The *Standard Oil Co. to furnish the city with 200,000 gallons of road oil during 1917 on its bid of 5.46 cents a gallon.

Great Falls, Mont.—City council, on concrete sidewalks, curbs and crossing ordered for the present year to *Fred Sauer. Bid was \$2,000. The bids for sidewalk and curbing were: Fred Sauer, \$4,644; Two-Miracle Co., \$5,557; Nilson & Smith, \$6,204.75, and Hanssen & Haug, \$6,256.43. On crossings, Sauer, \$850; Two-Miracle, \$850; Nilson & Smith, \$1,062.50; Hanssen & Haug, \$1,105.

Audubon, N. J.—Street paving. \$200,000, various streets, Engr. J. J. Alberson, Court House, Camden, care Conway Bennett, Audubon, concrete and macadam, to *J. M. Kelly Co., 432 Market St., Camden.

Garfield, N. J.—Grading, curb and guttering, Dewitt St., about 900 ft., to *Salvator Guardalibeni, Lodi, N. J., Engr. Anton L. Petterson, P. O. Bldg., Passaic, N. J. Frank Romanaglia, Boro. Clk., Municipal Bldg., Garfield.

Wilson, N. C.—For street paving about 50,000 yds. of bitulithic, 100,000 yds. of sheet asphalt, 50,000 lin. ft. of granite curb. Estimated cost, \$350,000. *Robert G. Laseter & Co.

Cincinnati, O.—*Wesley Taulman, Hazelwood, O., road improvement, \$4,900, Reading road, near Sharonville, Sycamore township, 1,600 lin. ft. grading and gravel. Engr., Wm. Boeh, Court House, Fred E. Wesselman, Pres., Hamilton County, Albert Reinhardt, Clk.

Cincinnati, O.—Hamilton county commissioners recommended that the contract for the improvement of the Carthage-Hamilton pike to *Foster, Mings & Slayton, of Richmond, Ind., at \$131,870, for a brick, grout filled and concrete curb improvement. The State Highway Department submitted the names and figures of the four bidders for the work, two of whom were Cincinnati concerns, A. J. Henkel and the John W. Sullivan and Kirchner Construction Co., T. J. Connell, of Cambridge City, Ind.

Cleburne, Tex.—City council authorized a contract with the *Cleveland Trinidad Paving Co., of Cleveland, O., for paving the square and one block each way with sheet asphalt pavement.

Corsecan, Tex.—For constructing 45 miles of gravel road at Frost, Navarro County, *McElwarth & Rogers, Atlanta, Tex., awarded.

McKinney, Tex.—For street paving 1 1/4 miles, *Kaw Paving Co., Manhattan, Kan., at \$33,000.

Mt. Vernon, Tex.—For constructing about 12 miles of road in Franklin County Road Dist. No. 1, *J. R. Johnson, Engineer, Clarksville, Tex.

Ottawa, Ont.—City council to *Warren Bros. Co., 142 Berkeley St., Boston, Mass., for the remodeling of the city's asphalt plant, to cost \$12,000.

SEWERAGE

Bridgeport, Conn.—Committee to finance new projects decided to introduce a bill into the legislature asking authority for the city to issue bonds for permanent municipal improvements totaling \$6,140,000. The amount includes: Street extensions, \$1,000,000; sewers, \$2,000,000; street pavements, \$1,000,000; park improvements, \$725,000; schools, \$1,000,000; isolation hospital, \$200,000; Public Welfare building, \$125,000; and police and fire departments, \$100,000.

Stratford, Conn.—Representative Ivan L. Morehouse presented in general assembly authority to allow the town to issue \$300,000 bonds for the construction of trunk sewers and sewage disposal plant. This is designed as the beginning of the sewer system. Hollister Height section will be attended to first, the center of the town next, then the outlying districts; also request of the State Highway Commissioner for an appropriation of \$200,000 for a new bridge across the Housatonic River between Stratford and Milford.

Jacksonville, Fla.—Bids received for \$125,000 sewer bonds Feb. 20 by board of bond trustees.

Swainsboro, Ga.—City plans to vote on bond issue to install sewage works. B. Scarborough, supt.

Tennille, Ga.—See "Water Supply."

Normal, Ill.—Cities of Normal and Bloomington considering construction of sewer on Linden St. City engineers of both places will prepare estimates in order to divide cost.

Anderson, Ind.—City considering construction of new sewer on E. Lyon St. City engineer estimates 3,000 ft. 22-in., 1,060 ft. 18-in., 2,000 ft. 15-in., 2,270 ft. 12-in.

Gary, Ind.—Construction of a district sewer system on the west side draining four square miles of territory and costing \$318,000, assured. Board of Public Works passed a confirmation resolution providing for the construction of District Sewer No. 35 and providing that bids for its construction shall be opened in two weeks.

Jackson, Ky.—City planning installation of sewer system.

East Elmhurst, L. I.—Work will be started on two important sewers, contracts for which have just been registered by the Controller. Humphrey St., from Grand Ave. to Astoria Ave.; McIntosh St. from Grand Ave. to Lyon Ave., and in Lyon Ave. from Gilmore St. to McIntosh St.; Lyon Ave. from McIntosh St. to Astoria Ave.; 45th St. from Astoria Ave. to Burnside Ave., and in Astoria Ave. from 45th St. to 48th St.; Hancock St. from Paynter Ave. to a point 220 ft. north, Long Island City.

Jessups, Md.—See "Water Supply."

New Bedford, Mass.—Arthur Perry & Co., Boston, successful bidder for \$43,000 sewer loan, premium 103.185. Bidders as follows: Chandler, Wilbur & Co., Inc., 103.09; Curtis & Sanger, 102.761; Estabrook & Co., 102.68; Blodget & Co., 102.67; R. L. Day & Co., 102.099; Adams & Co., 102.04; Cropley, McGarfe & Co., 101.02.

Pittsfield, Mass.—See "Streets and Roads."

Worcester, Mass.—Mayor Pehr G. Holmes decided to veto the order passed by the city council Dec. 22, authorizing the city solicitor to draft and to present to the legislature a petition and bill for Worcester to be authorized to borrow not more than \$500,000 outside the debt limit, the money to be used for sewer purification.

Worcester, Mass.—Alderman Gustaf A. Olin, member of the sewer committee of city council, submitted a plan, drawn by Matthew Gault, Supt. of Sewers, for handling sewage at the home farm. The plan provides for installing a pumping station and laying a trunk sewer which will force the sewage up through the main sewer pipes. Providing the overseers of the poor should adopt this plan, it would mean that not only would the sewage at the home farm be properly taken care of, but all of the sewage in Intervale and a portion of Burncoat St. would be carried away in a proper manner. To instal such a pumping station would cost the city about \$50,000. Overseers of the poor voted to file a petition

with City Clerk W. Henry Towne, asking the city council to consider installing such a system.

Escanaba, Mich.—At a cost of \$33,230 in three districts, city planning sewer construction.

Ada, Minn.—Specifications have been prepared for a \$25,000 sewer system. The question will be submitted to vote. Address Town Clerk.

St. Cloud, Minn.—City engineer is preparing plans for storm sewers to cost about \$12,000 to \$15,000. C. H. West, Engr.

Wabasha, Minn.—For about \$30,000, city plans to extend sewer system. J. F. Druar, 312 Commercial Building, St. Paul, engr.

Leland, Miss.—City has engaged Frank L. Wilcox St. Louis, Mo., to make surveys for proposed sewer system.

Randolph, Neb.—According to Water Commissioner G. D. Wiley, a complete water system will be installed next summer.

Rochester, N. H.—Petition for a deep sewer on Autumn St. in East Rochester was referred to the committee on water works and sewers.

Rochester, N. H.—Committee on water works and sewers received petition for the construction of a sewer between the eastern and western division railroad tracks on Winter St. for their consideration.

Camden, N. J.—City plans to construct a sewer or drain in and along Copewood St. from Haddon Ave. to Davis St., and in Davis St. from Copewood St. to Sheridan St.

Matawan, N. J.—It is reported construction of a sewer system contemplated by city.

Bronxville, N. Y.—Village Clerk Frank Dinsmore will receive bids Feb. 13 at 3 p. m., for \$3,300 sewer bonds.

Buffalo, N. Y.—It is practically sure that the three engineers who were hired by the city to delve into the question of whether the Niagara River is being contaminated by sewage from this city, will advise the council against abiding by the recommendation of the international joint commission that three sewage disposal plans be built by Buffalo at a cost of \$3,500,000.

Catskill, N. Y.—Plans are being made for disposal plant to cost about \$100,000. G. Warner, village engineer.

Spring Hope, N. C.—See "Water Supply."

Alliance, O.—City calls bids on sewage treatment plant. J. H. McConnell, director public service.

Canton, O.—See "Streets and Roads."

Cincinnati, O.—See "Miscellaneous."

Findlay, O.—Bids received by City Auditor P. S. Shoupe Feb. 15, noon, for semi-annual improvement bonds: Park Ave. sewer, \$450; South Cory St. sewer, \$490; College St. sewer No. 2, \$518; Beech Ave. paving No. 2, \$807; Adams St. sewer, \$900; South Park sewer No. 2, \$1,300; East Lincoln St. sewer, \$2,370; South Main St. paving, \$6,870; Clinton St. paving, \$7,930; East Sandusky St. paving No. 2, \$14,669.

Lancaster, O.—City plans sewers in storm water sewer dist. No. 12. J. Griggs, city engr.

Rocky River, O.—Sewer bonds bids will be received Feb. 12 by Village Clerk Frank Mitchell, amounting to \$50,000.

Spring, O.—See "Streets and Roads."

Carbondale, Pa.—For about \$60,000 city making plans for sewerage works. J. A. Saxe, city engr.

Longview, Tex.—Plans being prepared by H. N. Roberts, city engr., for sewage disposal plant for city.

Alexandria, Va.—See "Streets and Roads."

Victoria, B. C.—City council is considering the construction of a sewer on Edgeware Rd., connecting with the present sewer on Gosworth road. C. H. Rust, City Engr.

Halifax, N. S.—Work on the construction of the N. W. arm trunk sewer and other sewers may be commenced shortly. H. Johnson, Asst. City Engr.

London, Ont.—About Feb. 15 tenders will be called for the purchase of sewer pipes. City Engr., H. A. Brazier, City Hall.

Toronto, Ont.—The city council overruled the board of control's recommendation not to reconstruct a sewer on Margueretta St. for \$20,890.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Bridgeport, Conn.—For the construction of sewers in Ash St. and Berkshire

Ave., *B. D. Pierce Mfg. Co., by paving and sewer commission. The *Parsons Foundry Co. for making 300,000 lbs. of castings for sewer and manholes frames and covers at 3 1/4 cts. per lb.

Nampa, Idaho.—Following bids received in the installation of sewer in District No. 19: Roy Goggin, Nampa, \$1,632; Morrison-Knudson Co., Boise, \$2,078; Nampa Plumbing & Heating Co., Nampa, \$2,185.

Rock Island, Ill.—Board of local improvements, Wm. McConochie, Chm., to *P. F. Trenkenshu, for sewerage system. W. Treichler, Engr.

Lafayette, Ind.—The city board of works for the construction of lateral sewers in 14th, 18th and State Sts., to *Marreno-Burkham Co., of St. Louis. Mo. The 14th and State St. sewers was \$20,799.16 and \$12,431.48. *Foley Construction Co., of Chicago, the 18th St. sewer, at \$11,131.50.

Muscataine, Ia.—*R. M. Like, Davenport, Ia., for constructing sewers, at \$5,239.

Flint, Mich.—Contracts for materials for use in the construction of sewers during the present year by the common council. *The South Bend Foundry Co. for the furnishing of catch basins and manholes. The contract for 15 to 24-in. double strength vitrified and also concrete pipe 15 to 24 ins., to the *Flint Coal Co. This pipe is to be used for all sewer purposes. for segment block for sanitary sewers from 27 to 90 ins. in diameter to *J. P. Burroughs Co.

Albany, Mo.—For construction of joint district sewers and disposal plant and laterals in districts 2, 3, 6 and 8, at \$22,691. to *Edgar Main, Liberty, Mo., for general contract.

Akron, O.—Bids for sewers and laterals, by the city board of control, composed of the mayor, director of public service and safety director. M. H. O'Toole was the lowest bidder for work on Wildwood Ave., Hoyer Ave., Hodge and Brockway Sts., these four streets for \$3,924. The estimate was \$4,600. E. & W. McShaffrey & Co., \$15,205, on Cuyahoga, Shelby and Grace Aves. The estimate was \$17,740. O'Toole, \$2,205.60 on Homer, Ritchie and Orrin Aves., estimated to cost \$2,500. For Brook Ave., O'Toole, \$1,046; estimate of \$1,300. Charles H. Waters, for Hammel St., estimated to cost \$5,850. Bid, \$6,181.10. McShaffreys overbid the estimate of \$7,000 for the Gridley Ave. work. They offered to do it for \$7,375. Service Director Beck said that it was not likely that the streets would be re-advertised.

Swanton, O.—For constructing sewer in Dist. No. 2 at \$947. *J. L. Perkins, Swanton.

Cordell, Okla.—For constructing sanitary sewers and disposal plant, at \$23,936, to *Janas Contracting Co.

Sand Springs, Okla.—*F. P. McCormick, Muskogee, for construction of system of storm sewers, at \$28,555.

Tulsa, Okla.—*Carl Pleasant, this city, for constructing Cat Creek sewer, at \$14,000.

Tulsa, Okla.—*F. P. McCormick, muskogee, for paving 18 streets with asphalt and brick, asphalt and concrete alleys, at \$12,000.

York, Pa.—Council finally approved the contract with *Arnold Hoffman & Co. Delaware and Green Sts., Philadelphia, for supplying from 20,000 to 25,000 lbs. of chlorine at 14 1/2 cts. per lb., for the sanitary sewerage disposal plant for the treatment of sewerage this year.

Salt Lake City, Utah.—For the proposed outlet sewer of Salt Lake's sewer system was *J. W. Mellen; bid of \$98,582.

WATER SUPPLY

Edmonton, Alta.—The installation of a chlorine control apparatus for the bacterial purification of the city water supply to replace the present hypochlorite dosing apparatus, is contemplated by the water works department. Estimates are being asked of local firms. Acting City Engineer, A. W. Haddow.

Fort Jones, Cal.—Water works system is contemplated.

Salinas, Cal.—City council considered report of C. E. Grunsky, expert engineer, who was employed by the city to go over the storm water system problem. Cost of building will be in the neighborhood of \$60,000 and the mater of issuing bonds to that amount is to be taken up at the next meeting.

Sunnyvale, Cal.—Byrne & McDonnell, San Francisco, for the \$19,000 Sunnyvale municipal improvement bonds was accepted by board of trustees, premium of

\$945. Bonds \$15,000 for extensions and improvements to the municipal water system, and \$4,000 for the erection of a firehouse and the purchase of fire apparatus. Bids were received from E. H. Rollins & Sons, F. M. Brown & Co., Blyth, Witter & Co., Lumbermen's Trust Co., G. G. Blymer & Co., all of San Francisco, and from Torrance, Marshall & Co., of Los Angeles.

Putnam, Conn.—City considers improving water works. Hanscom Construction Co., 70 Kilby St., Boston, engr.

Denver, Colo.—Municipal advisory park board approved plans to undertake without delay the extending of the headgate for the city ditch, to increase municipal water supply. The survey for the work has been completed. The headgate will be carried up the Platte River for about a mile.

Tennille, Ga.—City has sold bonds to be used for constructing water works and sewer system.

Waverly, Ia.—The council is planning to expend \$15,000 improving water system.

Caldwell, Kan.—R. E. McDonald, consulting engineer, has prepared estimates for \$80,000 water system for which bonds have been voted. Address City Clerk.

Hazel Green, Ky.—Town will vote on the question of issuing \$40,000 bonds for water works.

Stratta, Me.—Literature from manufacturers of meters and water sterilization equipment would like to be received by Supt. O. Blanchard.

Jessups, Md.—For constructing reservoir, sewer and sewage disposal plant, cost \$50,000, contracts will be let in March. Robert B. Morse, engr., state department health, 21 W. Saratoga St., Baltimore.

Dracont, Mass.—See "Streets and Roads."

Haverhill, Mass.—City Engineer Louis C. Lawton in his annual report recommends that storm water drains be constructed in the following streets during the coming season: Main St. from Snow's Brook to Dustin Sq.; Main St. from Marsh Ave. to Walnut Sq.; Marsh Ave. from Main St. to North Ave.; Wellington Ave. from North Ave. to Lakeview Ave.; Macon Ave. from North Ave. to Commonwealth Ave. and Columbus Ave. from Lawrence St. to Lakeview Ave.

Pittsfield, Mass.—See "Streets and Roads."

Sherborn, Mass.—City making plans water works. C. M. Taylor, Grove St., Wellesley, engr.

Worcester, Mass.—Park Trust Co. successful bidder for the \$150,000 city water bonds, premium of \$400.19. Bidders: Jackson & Curtis, \$100.086 and Estabrook & Co., 100.06. Harry C. Smith, City Treasurer.

Duluth, Minn.—The manager of the water and light department was given authority to purchase a Smith motor chassis for the machine now used by the superintendent of the New Duluth branch, so that it can be changed into a delivery truck, and a new Ford roadster to take the place of the present machine. The total cost will be \$866.

Thief River Falls, Minn.—For the drilling of two 12-in. wells, city clerk was directed to advertise for bids.

Hancock, Minn.—City voted bond issue for a water works system.

Broadwater, Neb.—Installation of a water works system considered by town.

Page, Neb.—Town contemplates water works system.

Rochester, N. H.—Petition for the extension of the water service from East Rochester across Salmon Falls River to South Lebanon was referred to the committee on water works and sewers.

Atlantic City, N. J.—Finance Director Beyer of the city commission introduced a resolution authorizing the city to borrow the sum of \$180,000 at interest not exceeding 4 1/2 per cent. on temporary improvement bonds to pay for the cost of the installation of the new high pressure fire main under the boardwalk, between Maine and Morris Aves.; also the borrowing of \$65,000 for the dock and harbor improvement at the Inlet; \$40,000 for the construction of dams and improving the water sheds, installation of pumps and driving wells for the water department, and \$2,000 for the extension and improvement of Maryland Ave. north of Adriatic Ave., and opening of Huron Ave. to Beach Thoroughfare, were adopted.

Atlantic City, N. J.—City commission gave permission to receive bids for two trucks for the use of the water department instead of one.

Ogdensburg, N. J.—March 13 borough will vote on \$60,000 water system bonds.

Wharton, N. J.—Borough councilmen and eight citizens were appointed as a committee by Mayor Peter E. Styler to secure a new water supply.

Batavia, N. Y.—Common council seems to favor the submission to the taxpayers of a proposition to erect a more substantial structure above the filtration plant than the building for which local builders now have the contract.

Dunkirk, N. Y.—For this year's main extensions Supt. W. O. Peck preparing plans.

Gloversville, N. Y.—Board of water commissioners has endorsed for construction this year another storage reservoir to be located on Post Creek, capable of retaining 100,000,000 gallons of water; cost, approximately \$40,000.

Hightstown, N. J.—A water meter system is much in favor.

Oswego, N. Y.—Common council requested by the water department for a special fund of \$5,873 with which to put a new 8-in. main in East Bridge St. from Fourth to Ninth.

Schenectady, N. Y.—Superintendent of Water C. C. McWilliams submitted to the board specifications for welding the joints of the 10,200 ft. 36-in. steel lock-bar pipe connecting the Rotterdam pumping station and the Bevis Hill reservoir; a few changes was made. Bids will be advertised for in the immediate future.

Springhope, N. C.—The city contemplates vote on \$50,000 bonds for water and sewer construction, street and electric light improvements. Address the Mayor.

Warsaw, N. C.—The town commissioners have employed an engineer to make a survey of Warsaw, locate water and supervise the installation of a water and electric lighting plant.

Bluffton, O.—Village will vote on a \$35,000 bond issue March 6 to remodel the present municipal light and water plant.

East Liverpool, O.—City auditor J. A. Kenney will receive bids Feb. 12, noon, for \$175,000 water works bonds.

Lima, O.—City council authorized the service director to employ an engineer on the Ottawa Creek improvement, at \$115 a month, and rodmen at \$60 a month.

Lima, O.—City council to authorize the issuance of a \$30,000 bond issue to supplement the \$550,000 bond issue authorized by the voters last year, for the purpose of reconstructing the Lima water works system.

Lima, O.—Bids received Feb. 26, noon, for the purchase of \$30,000 water bonds, D. L. Rupert, City Auditor.

Springfield, O.—City Manager Charles E. Ashburner is working on two projects, a garbage disposal plant and a system whereby water consumers of the city will put in water meters, making the entire water service of the city metered.

Toledo, O.—Water Superintendent Thomas Cook ordered 1 1/2 miles of pipe for extensions and improvements at cost of \$8,000.

West Jefferson, O.—February 6 an election will be held to vote \$20,000 bond issue for a water works system.

Oklahoma City, Okla.—The city commissioners will advertise for bids on conduit for water system. The conduit is to be 7 1/2 miles long, running from the settling basin to the main dam. Its estimated cost is \$175,000. With the letting of the contract for the conduit all the work on the new water works will have been contracted for. Address Commissioner Donally.

Alburtis, Pa.—Installation of a water works system discussed by borough council.

Dallastown, Pa.—A movement has been launched for the borough to obtain its own water system. Citizens object to advance rates of the York Co. Consolidated Water Co., now supplying. Council will consider the digging of artesian wells, building its own reservoir and laying water mains.

Johnstown, Pa.—City applies to State Health department at Harrisburg for a permit for the building of a sewage disposal plant on the site purchased some time ago, in West Taylor Township.

Williamsport, Pa.—Councilman Harris offered an ordinance for the construction of a section of storm water sewer in Walnut St. between Edwin St. and Park Ave.

Pecos, Tex.—H. LaSalle, of El Paso,

has a municipal franchise to pipe water to Pecos, 14 miles pipe line and to construct a reservoir at wells. Municipal water works will be purchased, the system extended to all parts of residential section.

Coeburn, Va.—Bids called by city commissioners for improvement to water works.

Lynchburg, Va.—Common council adopted resolution over Mayor Jester's veto to spend \$360,000 improving the city water supply, which includes completing a scheme to use James River water as an extreme emergency. The aldermen will later take similar action.

Benwood, W. Va.—City contemplates construction of a municipal water works plant.

Chatham, Ont.—City council plans to construct water mains from St. Clair St. to city limits, 1,650 ft.; from city limits to River Crossing, 1,111 ft., and from River Crossing to Jointing, 300 ft. 12-in. vitrified tile. Clerk, J. C. Weir, Harrison Hall.

Hamilton, Ont.—James Bain, engineer at the Beach water works pumping station, suggested to the Board of Control as a solution of Hamilton's water problem that a turbine and a 10,000,000-gallon pump be installed at a probable cost of \$50,000 to tide over the situation until times become normal again. He was instructed to prepare plans and secure data in the matter.

Kincardine, Ont.—The question of a new water supply for the town is being considered. Clerk, J. H. Scougall.

Vancouver, B. C.—Work will be commenced immediately by the city engineer's department upon the excavation for the water main to be laid to the Industrial Island in False Creek.

North Vancouver, B. C.—Acting District Engineer J. McCready in his annual report recommended that a water system be put in on McKay Creek to supply waterfront industries.

London, Ont.—The laying of new water mains considered by the Utilities Commission in the spring and will be in the market shortly for cast iron piping. E. V. Buchanan, City Hall, general manager.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Decatur, Ill.—Commissioners approved recommendation of Commissioner Robbins that the contract for a year's supply be made at the price of \$1.65 per hundred for alum necessary as a coagulant in treating water for domestic purposes. It will now cost the city \$5,600 per annum.

Mohawk, N. Y.—Municipal commissioners let contract with *George D. Pohl Co. for the gasoline engine, a part of the auxiliary pumping station.

MISCELLANEOUS.

Berkeley, Cal.—The commissioner for public works was authorized to sell all the old street department equipment, together with five horses and several wagons. Will be sold at auction at the new corporation yard on Feb. 9 at 2 o'clock.

Los Angeles, Cal.—Feb. 2 an election will be held to vote on the question of issuing flood control bonds, \$4,450,000.

Modesto, Cal.—A proposition to issue swimming pool bonds to the amount of \$10,000 will be submitted to the voters at the April election.

Palo Alto, Cal.—Mayor Cooley announced that the Southern Pacific Co. will make new plans for the proposed subway.

Bridgeport, Conn.—See "Sewerage."

Washington, D. C.—Bureau of Foreign and Domestic Commerce (Department of Commerce).—A man in Cuba desires to represent American manufacturers and exporters of wire, plain, galvanized, and corrugated iron sheets, iron and steel pipe, and general hardware. Refer to Opportunity No. 23610.

Washington, D. C.—Bureau of Foreign and Domestic Commerce (Department of Commerce).—A man in France wishes to secure an agency for the sale of building materials, such as bricks, refractory clay products, window glass, wood, and bags for cement, plaster, etc. Quotations should be made c. i. f. French port. Correspondence should be in French. References. Refer to Opportunity No. 23568.

Decatur, Ill.—Possibility of the Alfs

Garbage Co. incinerating plant becoming a municipally owned project is being discussed by its owners and it is understood that the question may come up in some form at one of the council meetings.

Pekin, Ill.—Tremont, Hopedale, Boynton and perhaps other townships will vote next April on the proposition to levy a tax for oiling roads.

Quincy, Ill.—Mayor called the attention of the aldermen to the matter of providing for an incineration plant for the disposal of the city's garbage.

Gary, Ind.—Miller & Co., Indianapolis, for \$400 premium, successful bidder park bonds to the amount of \$60,000; 4½ per cent, 20 years.

Davenport, Ia.—City Engineer Roscoe E. Sawistowsky will petition the city council to purchase a Ford auto for the use of his department. Cost, \$360.

Frankfort, Ky.—Frankfort fiscal court ordered all the county's road rollers, tractors, crushers, rockbins, sprinklers, water wagons, graders and all road tools to be publicly sold at 2 p. m., Feb. 8, at the Brawner coal yards, Frankfort, Ky. Sherry B. Smith, road engr.

Baltimore, Md.—Representing an outlay of approximately \$15,000,000, the Pennsylvania railroad has submitted plans for the improvement of its terminal facilities here to Mayor James H. Preston for the consideration of the municipal authorities and the city council. One of the main features of the plans provides for the construction of twin tubes paralleling generally the present tunnel under the city. No mention is made of electrification of the terminals, one of the points upon which the city has always insisted.

Beverly, Mass.—City council appropriated \$6,000 to purchase a motor truck and trailer for the collection of ashes and waste paper and general work for the street department.

Haverhill, Mass.—Mayor Morse recommends that the city council investigate the advisability and the cost of putting up a harbor line wall or bulkhead of either concrete or stone on the city landing on Water street, known as the "engine house property."

Detroit, Mich.—Aldermen of the 18th ward, have asked Police Commissioner Couzens to include in his budget an appropriation for a new police station to be located in the vicinity of Michigan Ave. and Martin St.

Detroit, Mich.—Expenditure of approximately \$200,000 for additional playground sites is now before the common council committee on recreation and playgrounds, on recommendation of Ira W. Jaryne, superintendent of the recreation commission.

White Cloud, Mich.—An election will be held in April to vote \$60,000 for court house, jail and sheriff's residence.

Meridian, Miss.—It is reported that a petition is under preparation that will be circulated and presented to the city council, asking a bond issue be made for the purpose of constructing a municipal ice plant in connection with the water works.

Senatobia, Miss.—Drainage system bonds will be offered for sale (\$85,000).

Great Falls, Mont.—Council approved the public improvement committee, reporting on a communication from City Engineer L. B. Evensen, recommended that the city advertise for bids on a motor street sweeper.

Milburn, N. J.—Township Com. contemplates constructing incinerating plant. Address Dr. Wellington Campbell, member.

Brooklyn, N. Y.—Borough President Connolly has been notified by the corporation counsel that title has been vested by the city in the following Flushing streets, and that public improvements can be made in them: Bayreuth St. from Bowne Ave. to Parsons Ave.; Magnolia Ave. from Ash St. to Bayreuth St.; Syringa Pl. from Ash St. to Bayreuth St.; Burling Ave. from California St. to Delaware Ave.; Phlox Pl. from Bayreuth St. to California Ave., and California Ave. from Bowne Ave. to Parsons Ave.

Buffalo, N. Y.—Deficiency bond sale will be held Jan. 29 at 11 o'clock. Three issues authorized by council, \$36,000 to be credited to the fund for the subway under the Lackawanna Railroad tracks in Elmwood ave., \$25,000 for the removal of snow and ice, and \$22,500 to pay the expenses of revising the assessment rolls to include machinery and equipment as real property.

Buffalo, N. Y.—Comnr. Arthur W.

Kreinheder recommended the need of motor apparatus for the transportation of garbage and refuse from sections of the city where long hauls are required from the barns to the disposal points. Thirty per cent of the equipment, he said, should be motorized.

Binghamton, N. Y.—Clerk Strong was directed to advertise for one 5-ton motor combination street sprinkler, flusher and oiler; also for 9 garbage wagons to be used in the new garbage collection system. Are to be of steel construction and are of a design made by Comnr. of Public Works John A. Giles. They are arranged so that the contents of the wagons may be dumped automatically, the wagon box tipping to the side. They are of steel construction so that they may be cleaned by the use of steam and hot water.

Dolgeville, N. Y.—Town will purchase two sidewalk plows. City Engr.

Lackawanna, N. Y.—Town will purchase two snow scrapers. City Engr.

Spring Hope, N. C.—Election will be held shortly to vote \$50,000 improvement bonds.

Barberton, O.—City contemplates constructing garbage disposal plant. H. W. Alcorn, city engr. R. Winthrop Pratt, 2048 E. 82nd St., Cleveland, consulting engineer.

Cleveland, O.—Bids will be received by the board of county commissioners of Cuyahoga County until 10 o'clock a. m., central standard time, on the 7th day of February, for the purchase of \$600,000.

Sandusky, O.—County commissioners already are planning on purchasing three motor cars for use of county officials when a bill now before the legislators is passed.

Springfield, O.—See "Water Supply."

Altoona, Pa.—City contemplates constructing incinerating plant. Jas. W. Shields, City Engr.

Erie, Pa.—Mayor Miles B. Kitta named in council a commission of five to confer with the local legislators and council regarding harbor improvements here.

Erie, Pa.—Council arranged to purchase from Gus H. Hanna, former street commissioner of Cleveland, who represents the Tiffin Wagon Co., Tiffin, Ohio, a motor-driven street flusher of 1,200 gals. capacity.

Harrisburg, Pa.—City Council received an ordinance appropriating \$1,000 for the employment of an architect to work with the city engineer in drawing plans and making specifications for the proposed comfort station or stations and footwalk on Market Square. The measure passed first reading and will be up for final action. The city has voted the sum of \$25,000 with which to make the improvement.

Reading, Pa.—City plans to lay out new park and playground; cost \$20,000.

York, Pa.—City contemplates constructing artificial lake and swimming pool, 250 x 400 ft.; cost about \$10,000. C. F. Wallow, archt., City Hall.

Wilkes-Barre, Pa.—After long arguments it has been decided by Mayor John V. Kosek, City Commissioner Goeringer and City Solicitor McHugh, a committee named by council to investigate, that the disposal of garbage in this city shall be by incineration and that the plant to be used is the plant of the Bennett Garbage Disposal Co. in the Firwood section.

Lake Andes, S. D.—Bids received Feb. 20 for \$150,000 court house bonds. County auditor, Frank Masur.

Sioux Falls, S. D.—County commissioners of Moody and Lake counties made arrangements for the awarding of the contract in about 60 days for the construction of an immense drainage ditch in sections of the two counties. The ditch will reclaim several thousand acres of valuable farm land. It will be about 8½ miles in length and is estimated to cost about \$60,000. About 75 per cent of the land to be reclaimed is in Lake county.

Knoxville, Tenn.—Comnr. Flenniken was authorized to purchase a small automobile to be used in inspecting the streets of the city.

Maryville, Tenn.—Voters will decide Feb. 24 on whether or not a franchise shall be granted to the Knoxville Interurban Railway Co. for the construction of railway tracks and the operation of cars over certain streets.

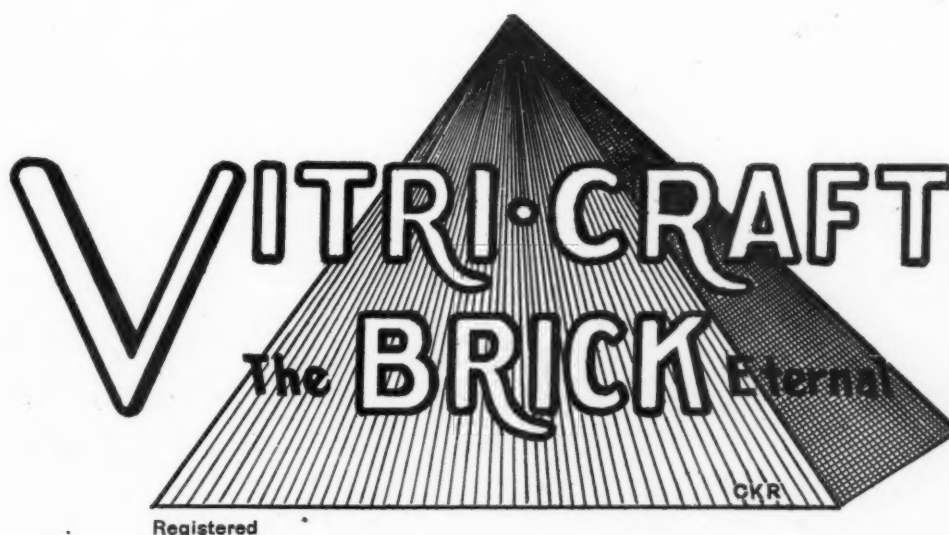
Memphis, Tenn.—The city commissioners have decided to install safety zone posts on all corners on Main St. from Poplar Ave. to Beale Ave. Commissioner

A PENNSYLVANIA COMPANY

SCHUYLKILL VALLEY VITRIFIED PRODUCTS COMPANY

OAKS, MONTGOMERY COUNTY, PA.

Street Pavers and
Building Brick
Sewer Liners and
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PHILADELPHIA & READING RAILWAY

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WESTERN UNION TELEGRAPH

BELL TELEPHONE

SCHUYLKILL VALLEY VITRIFIED PRODUCTS COMPANY

OAKS, MONTG. CO., PA.

Walter G. Boland

Douglass has written for prices on posts and flags to be installed.

Austin, Tex.—The mileage of paved streets requiring to be sprinkled has been extended so greatly that Councilman Haynes, head of the city sanitary department, declares he will have to get increased equipment, and he has decided to include in his estimate of 1917 needs an item covering the purchase of a motor-driven sprinkler.

Brownwood, Tex.—Citizens voted for the building of a modern fire station and city hall.

Floresville, Tex.—An election will be held Feb. 16 to vote on the question of issuing city hall bonds (\$5,000).

Ogden, Utah.—Residents of Ogden are discussing the question of a new county court house.

Salt Lake City, Utah.—City Comn. may install new switchboard for Public Safety building; cost, \$3,500.

Wheeling, W. Va.—A concrete retaining wall two miles long is included in the plans being formulated by the Wheeling Commerce Association for the protection of Wheeling Island from flood.

Meridian, Wis.—An election will be held Feb. 6 to vote railroad bonds to amount of \$6,000.

Sturgeon Bay, Wis.—City contemplates improving Peninsula Park; cost \$10,000. D. E. Doolittle, supt.

Superior, Wis.—A committee was authorized to purchase an automobile for the county sheriff for about \$1,000.

Winnipeg, Man.—The Elgin Ave. and Elmwood incinerators are reported defective, and City Engineer W. F. Brereton has recommended a new 150-ft. steel stack at a cost of \$5,500 and a concrete shaft at a cost of \$6,450.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates contracts awarded.)

Albion, Ind.—For furnishing tile for Sparta township, Noble county, was let to *North, Frazier & Co., of Bluffton, Ind., for \$949. For construction to *Clarence A. Martin, of Albion, Ind., for \$782.50.

Evansville, Ind.—The Interstate Rendering company will collect deliver and dispose of all garbage and dead animals for the city for the next ten years, common council unanimously adopted the ordinances ratifying the contract entered into with the company by the board of public works, Dec. 4, last.

Des Moines, Ia.—*W. H. Stokes, of Superior Garbage Furnace Construction Co., Dallas, Tex., at \$11,250, to erect an incinerator with a capacity of 25 tons or more a day on S. 6th St., near the Coon River.

Augusta, Kan.—The city council let a contract for a \$25,000 city hall, for which bonds recently were voted.

Pittsfield, Mass.—Finance committee of the city council to *John Ranshousen for bonding the city officials, price \$546.60.

Johnstown, N. Y.—Bids received Feb. 1, by City Chamberlain E. A. James, \$54,000 worth of city bonds. Of this amount \$27,000 are refunded railroad bonds and the other \$27,000 are local improvement bonds.

Seattle, Wash.—Bids opened by the Board of Public Works for the construction of the city comfort station at Westlake, Stewart and 6th Ave., *Emil Pohl, 3406 37th Ave. So., \$11,369.

Hamilton, Ont.—The *Ottawa Contracting Co., Ottawa, Ont., for the building of a wharf to cost \$4,500.

Trenton, Ont.—The Gaylord Construction Co. for concrete mixer to *Wettlaufer Bros., Ltd., Toronto.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS.				
N. Y., L. I. City	11 a.m., Feb. 9..	Completing abandoned grading and sidewalk contract, requiring 19,300 sq. ft. concr. walk and 930 yds. grad..	M. E. Connelly, Boro Pres.
N. C., Asheville	Feb. 10..	25,000 sq. yds. asphalt or Topeka, 4,650 sq. yds. sheet asph., 4,650 sq. yds. brick and 4,300 sq. yds. durax.....	J. H. Lee, Pur. Agt.
O., Columbus	noon, Feb. 13..	Grading and paving with brick.....	G. A. Borden, Dir. of P. Serv.
Wash., Everett	Feb. 13..	Constructing concrete roads.....	A. B. Dean, Chief Dep. Engr.
Va., Richmond	Feb. 16..	Paving several alleys	C. E. Bolling, City Engr.
Wash., Everett	Feb. 19..	Constructing concrete road	A. B. Dean, Chief Dep. Engr.
SEWERAGE.				
Va., Roanoke	Feb. 24..	Constructing small sewer	F. L. Gibboney, City Engr.
WATER SUPPLY.				
Mass., Boston	noon, Feb. 7..	Five flushing gates complete	E. F. Murphy, Comr. Pb. Wks.
O., Columbus	noon, Feb. 12..	600-ton c. l. pipe and specials	G. A. Borden, Pres. Bd. of Pur.
MISCELLANEOUS.				
Mich., Flint	8 p.m., Feb. 2..	Gravel washing plant at Otisville.....	E. E. Newcombe, City Clerk.
Mass., Boston	noon, Feb. 5..	Crushed stone, bank gravel and sand.....	Patrick O'Hearn, Supt. Sup'l's.
Md., Comberland	noon, Feb. 6..	Five-passenger automobile	Angus Ireland, Clk., Co. C'mrs.
D. C., Washington	Feb. 13..	Furnishing gates, pipe fittings, silica sand and grit, creosote oil, etc.	Gen. Pur. Officer, Pan. Canal.

STREETS AND ROADS

Sacramento, Cal.—Senator E. S. Rigdon of Cambria asked for an appropriation of \$350,000 to construct a highway and close a gap of 65 miles between Monterey and San Simeon. It is desired to give a direct route from Southern California to Monterey along the ocean shore.

Visalia, Cal.—Tulare county may decide Feb. 27 as the date to vote on \$2,200,000 bond issue to build 170 miles of permanent concrete roads, using a 5-in. base and 1½-in. wearing surface.

Stamford, Conn.—Senator Mead of Greenwich introduced in the House bill appropriating \$50,000 for building sidewalks on that part of the Post road into New York, which lies between the Stamford-Greenwich town line to the New York State line. Providing that 10 per cent. of the amount of the appropriation made by the State for highways shall be spent for the purpose of laying sidewalks on the Boston turnpike.

Savannah, Ga.—Board of purchase rejected bids for \$10,000 worth of cement for use in street paving. Will probably advertise the third time.

Challis, Ida.—Messrs. James N. Wright & Co., Denver, successful bidder for \$100,000 highway bonds.

Boonville, Ind.—Three issues of Warwick county highway bonds, \$11,521, \$11,179 and \$5,300, 4½ per cent., ten years, were sold to J. F. Wild & Co., Indianapolis, for a total premium of \$1,146.65.

South Bend, Ind.—Construction of a good road between this city and Niles, Mich., south, is considered among the leading citizens across the State line. Brick is the material favored. It is proposed that Niles township vote a bond

issue of \$35,000 to pay the difference between the estimated cost of a stone road to the State line as has been proposed and a brick paved road laid on a concrete foundation. It is stated that Berrien county has expended about \$700,000 in the last few years on the stone road type of construction and that the desire seems to be to get away from this type and to make use of some material which many consider much better.

Hutchinson, Kan.—City commission placed on first reading an ordinance providing for the paving of the block between 16th and 17th Sts. of North Walnut; also included the curbing and guttering of Plum St. from Sherman to Ave. A.

Ashland, Ky.—Merchants Bank & Trust Co. of Ashland successful bidder, street improvement \$33,382.46 bond issue.

Ludlow, Ky.—Successful bidders for Elm St. viaduct bonds to the amount of \$15,600. Feibel-Ellschak Co. of Cincinnati at a premium \$877.50. W. B. Cullen, City Clerk.

Duluth, Minn.—Commissioner Farrell, works head, completed a statement, showing how the proposed \$200,000 bond issue would be apportioned, if the bill is passed by the state legislature. Copies of the statement will be sent to the Duluth members of the legislature, in order that they may understand the plans of the works department. The total estimated cost is \$229,500, according to the statement, which follows: Bridge across Chester Park, \$45,000; filling in or repairs, Grand Ave. and 72d Ave., W., \$40,000; Grand Ave. and 26th Ave., W., \$1,000; Oneota St. and 43d Ave., W., \$2,000; Oneota St. and 40th Ave., W., \$2,400; Grand Ave. and 67th Ave., W., \$11,000; First St. and 13th Ave., E., \$2,200; Grand Ave. and 61st Ave., W., \$20,000; Tenth St. and Fifth

Ave., E., \$8,400; Central Ave. and Polk St., \$40,000; Woodland Ave. and St. Marie St., \$5,000; Wallace Ave. and St. Marie St., \$1,500; Polk St. and 59th Ave., W., \$40,000; Superior St. and 12th Ave., W., \$3,500; either Ninth or Eighth St., at First Ave., W., \$7,500.

Passaic, N. J.—The entire list of proposed road improvements to be made in Passaic county during the coming spring and summer shows an aggregate cost of over \$800,000. Plans are being made now by the board of freeholders. Among the roads to be improved with concrete are Kingsland Lane, Delawanna to Essex county, 1,200 ft., \$5,000; Franklin Ave., Delawanna, from Essex county to Passaic county, 5,319 ft. concrete, \$20,000; Van Houten Ave., from Bloomfield Ave. to Clifton Ave., 7,300 ft., concrete, \$32,000. One of the most important to be made in the city will be the permanent improvement of what is now known as lower Main Ave., from the Erie Railroad (Franklin Crossing) to the county bridge. Granite block will be laid there by the county, cost \$12,000. Another is granite block for Main Ave. from the Newark Branch of the Erie, in South Paterson, to Harrison St., this city, 14,300 ft., \$250,000.

Springfield, O.—Resolution adopted by

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ALBANY

city council to improve the roadway portion of Columbia St. from Lowry Ave. to Western Ave., by draining and paving.

Springfield, O.—Chief Engineer M. J. Bahin completed estimates on street paving to be done this year. For work on Oak St. from Clifton St. to Kenton St. is \$13,321.30. Provides for sheet asphalt, asphalt block, brick or bitulithic. Should asphaltic concrete be used the rate will be 33 cts. per ft. The estimate on the paving of Grand Ave. from Center to Plum Sts. for sheet asphalt, asphalt block, brick or bitulithic is \$16,393.70. If asphaltic concrete is used the rate will be \$3.94. On both of these projects bids will be received on all of the material.

Springfield, O.—Resolution adopted to improve the roadway portion of Belmont Ave. from the north property line of Mound St. to Harrison St., by paving and draining.

Springfield, O.—City to improve the roadway portion of High St. from Light St. to Williams St., by paving.

Erie, Pa.—Street Director W. D. Kinney introduced three paving ordinances: referred to committee of the whole. The bills provide for draining, grading and asphaltting of 25th St. from Parade to Ash Sts.; Wayne St. from 26th to 28th, and Plum St. from Park Ave. north to Second St. With final passage, City Engineer F. G. Lynch will call for bids.

Williamsport, Pa.—City engineering department has prepared profile map showing the route of the proposed extension of the trolley line west into Newberry by way of Third St. It will be presented to city council for approval, after which definite steps in this west end improvement are likely to be taken.

Dallas, Tex.—See "Water Supply."

Salt Lake City, Utah.—Expenditure of \$1,032,405 for public improvements in Salt Lake this year is recommended in a tentative program presented to the city commission by Commissioner Heber M. Wells of the street department. Depends entirely on whether or not the city administration is successful in putting through a bond issue for public improvement purposes. Program consists largely of paving extensions, but includes also some curb and gutter, storm sewer and the covering of the 13th South canal, as follows: Paving Ninth South, Sixth to Ninth East, \$43,030; Ninth South, Main St. to Fifth East, \$78,985; Third East, Ninth South to Hubbard Ave., \$4,245; Ninth South, 11th East to 13th East, \$30,135; Seventh East, Fifth to Ninth South, and Seventh South, Fifth to Ninth East, \$105,927; Center St., Second North to Clinton Ave., and Fifth North, First West to Second West, \$56,590; 13th East, Westminster Ave. to 21st South, 21st South, Sugar House to 13th East, \$22,775; Eighth South, Main to Fifth West, and Fourth West, Eighth South to Ninth South, \$107,985; Eighth South, Eighth West to Jordan River, Indiana Ave., Jordan River to Redwood road, \$70,690; Third South, 10th East to 11th East, 11th East, Second South to Fifth South, Fifth South, 11th East to 13th East, \$76,240; 11th East, South Temple to Second South, \$33,452; 11th East, Fifth South to Ninth South, \$44,763; Second East, Fourth South to Sixth South, \$29,605; Seventh East, 21st to 27th South, \$45,605; Third East, Third South to Sixth South, \$38,895; 10th East, South Temple to Second South, \$23,400; Second Ave., Canyon road to Center St. and C St., South Temple to Second Ave., \$18,000; Ninth Ave., B St. to H St., \$19,850; 17th South, Ninth to 13th East, \$29,602; 15th East, 13th to 17th South, \$40,050; Fifth South St., Fifth East to Ninth East, \$59,270; Seventh South, Main St. to First West, \$24,705; Fourth East, Fourth South to Sixth South, \$25,306; Canyon road, Second to Third Aves., \$3,300. Curb and gutter: I, J and K Sts., from Third to 11th Ave., \$27,000; Ninth South storm sewer, Fifth West to Seventh West, \$8,000; covering 13th South canal, State to Third East, \$9,200; covering 13th South St. canal, Third East to Fifth East, \$9,000.

Richmond, Va.—Bids rejected for grading and paving the alley between Broad and Grace, 22d and 23d alley between Main and Cary, from 17th to 18th, and the alley between Cary and Taylor, from Granby to Meadow St. City Engineer Bolling instructed to readvertise.

Arlington, Wash.—Special road meeting held under auspices of the Commercial Club to consider North Fork paving project, favored construction of a 16-ft. hard surface highway on the North Fork. W. C. Pickford is county engineer. Everett.

Mt. Vernon, Wash.—The council passed a resolution providing for the improvement of Park St. from Cleveland Ave. to

SEWER CLEANING MACHINE



With the **Kuhlman Sewer Cleaning Machine** you can clean your sewers quickly and economically. No wet disagreeable work, because all work is done from the surface. The expansion buckets will bring up anything, be it sand, mud, gravel, rags, brickbats or other obstructions. The jaws close automatically. The Manhole Guide Jack guides the buckets out of the sewer tile and up through the manhole to the surface.

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Sewer Rods that cannot come uncoupled in a sewer and will float at 12½c. per foot.

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332 Sheffield Ave. Hammond, Ind.

the center of Dyke St. by excavating, filling, etc. E. C. Crookston, City Clerk.

Toronto, Ont.—R. C. Harris Comr. of Works, has recommended the construction of an asphalt pavement on Cawthra Ave., estimated to cost \$2,988, and concrete curbing on Davenport road, at a cost of \$6,095.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Lakeland, Fla.—For 12 miles of asphalt concrete paving let by the city to the Alabama Paving Co. of Birmingham, an aggregate price of \$176,475. The paving to be laid on a clay base approximately 300,000 sq. yds. and the contract price is \$1.35 per yard.

Everett, Wash.—Snohomish county opened bids Jan. 15, for paving county road, one-course concrete, 62,728 sq. yds., including foundation, gravel, loam and places of clay, 7 ins. thick in the center, 5 ins. on side and 16 ft. wide, excavation material surface grading only, 34,245 lin. ft. *P. J. McHugh, Seattle, Wash., \$1.30 paving per sq. yd., 10 cts. per lin. ft. surface grading, total \$92,319.85. Bidders: Avery Const. Co., Portland, Ore., \$1.28½ paving per sq. yd., 20 cts. per lin. ft. surface grading, \$94,434.43; Wash. Paving Co., Tacoma, Wash., \$1.33 paving per sq. yd., 17 cts. per lin. ft. surface grading, \$96,293.34; Bancroft & Morgan, Everett, Wash., \$1.46 paving per sq. yd., 15 cts. per lin. ft. surface grading, \$104,920.68. A. B. Dean, Chief Dep. Engineer.

Everett, Wash.—Snohomish county opened bids Jan. 15, for paving county road, one-course concrete, 43,500 sq. yds., including loam, gravel surface foundation, 7 ins. thick in the center, 5 ins. thick on side and 16 ft. wide, excavation none (surface grading), 24,368 ft. *P. J. McHugh, Seattle, Wash., \$1.28 paving per sq. yd., 10 cts. surface grading per lin. ft., total \$60,523.80. Bidders: Wash. Paving Co., Tacoma, \$1.28 paving per sq. yd., 17 cts. surface grading per lin. ft., \$62,262.56; Bancroft & Morgan, Everett, Wash., \$1.32 paving per sq. yd., 15 cts. surface grading per lin. ft., \$63,215.20; Avery Const. Co., Portland, Ore., \$1.32 paving per sq. yd., 20 cts. surface grading per lin. ft., \$64,548.60. A. B. Dean, Chief Dep. Engineer.

SEWERAGE

Jacksonville, Fla.—Citizens will vote March 8 at special election on a \$40,000 bond issue for the purpose of extending sewer systems.

Detroit, Mich.—City Engineer Clarence W. Hubbell plans to install a \$16,000,000 sewer system for the city. To treat sewerage by reduction, a system that will

care for a population of 2,600,000, to provide sewerage facilities in 1917 for at least one-half the recently annexed territory, to increase in this territory 44 miles of sewers, to complete the entire system within five years, adding 500 miles of sewers. To make every effort to provide sewers immediately for new districts so that home building and factory construction may proceed as a means of relief to the present congestion in both forms of building.

St. Louis, Mo.—The board of public service approved plans of the city plan commission for improvements which are estimated to cost about \$8,500,000. They include converting the Rives des Peres into a combined open channel and closed sewer, \$6,000,000; building an industrial railroad on the north bank of the Rives des Peres, connecting with the Frisco at Lindenwood and the Iron Mountain at the Mississippi River, \$700,000; a driveway on the south bank connecting with King's highway, \$1,277,600, and a viaduct over Ivanhoe Ave. on McCausland Ave., \$400,000 as the city's share.

Trenton, N. J.—City approved an ordinance to authorize the construction of sewer No. 672 in North Dean Ave. Fred W. Donnelly, Mayor; Leon D. Hirsch, City Clerk.

Fairport, N. Y.—The village will receive bids on \$25,000 storm drain bonds Feb. 23, 1917. C. F. Fisher.

Winston-Salem, N. C.—City will vote at the election March 27 for the purpose of authorizing \$175,000 bonds for sewer extension and \$125,000 for water extension.

Barberton, O.—An election will be held March 6 to vote on the issuance of \$150,000 worth of bonds to be used in the construction of a complete sewage system and disposal plant in the village.

Clifton Heights, Pa.—Sewer bonds issue of \$70,000 purchased by First National Bank of Clifton Heights, premium of \$525.

Dallas, Tex.—See "Water Supply."
Salt Lake City, Utah.—See "Streets and Roads."

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Erie, Pa.—*Willis Bancroft Jr., secured contract awarded by city council for construction of 9-in. sewers in 13th St. from Plum St., 330 ft. east, for \$359, estimate \$510; 13th St. from Plum St., 300 ft. west, \$470, estimate \$630; 31st St. from Plum St., 250 ft. east, \$380.50, estimate \$460, and 31st St. from Cascade St., east 560 ft., \$884.50, estimate \$1,030. *F. G. Dieffendorf, for a 12-in. sewer in 13th St. from Wood road to Perry St., and south in Perry St. to 31st St., west in 31st St., 550 ft.



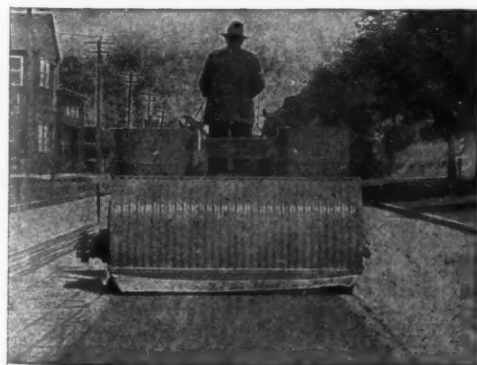
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ONE GOOD SNOW STORM

THE price of a Baker Snow Plow is **very** reasonable—but even at that let's forget it. Think what it will **save**. It does the work of fifty men with shovels—that we will prove to you. If one man does the work of fifty, you can easily figure what you would save in one good storm. Now—keep those figures handy and write for catalog and the price of this machine. What you are losing each year will make you **attentive** at least!

BAKER SNOW PLOW

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For use with two horses for streets—and one horse for sidewalks. While you're sending for a catalog of the snow plow, ask for literature on the Baker Dustless Pick-up Sweeper. It's a good thing to have on file. This—

PICK-UP SWEEPER

moistens the litter, picks it up, and then dumps it in compact piles 500 feet apart. One man operates it and the team makes only ten stops instead of about 170 per mile. You can either abolish your push broom men or increase their efficiency.

Winter is a good time to think of summer **street** tools.

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by

A. Prescott Folwell



A new book devoted to the practical design and construction of streets. The only one treating of alignment, grade and cross section, the location of sewers, manholes, fire hydrants, fire alarm boxes, street signs and other features of the modern city street. Each is considered in respect to its interrelation with all the others. 242 pages. 151 illustrations, Price \$2.00. Sent anywhere on approval.

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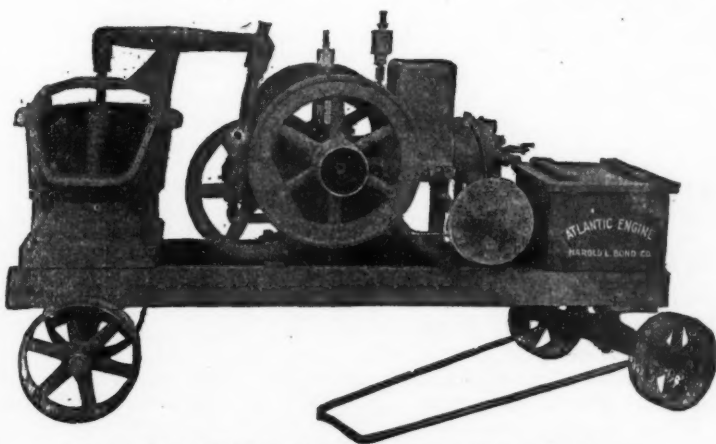
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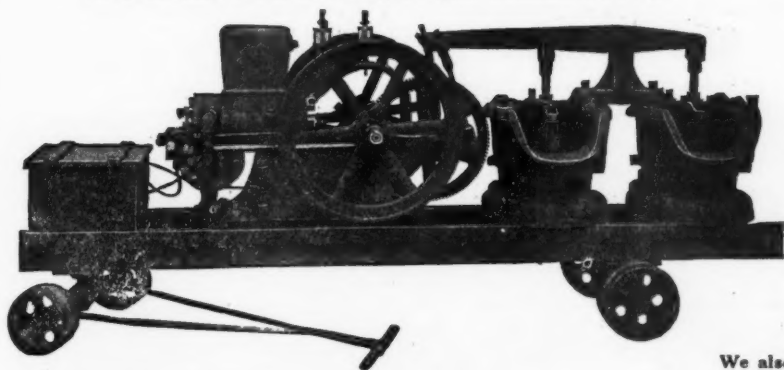
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New 4-inch Atlantic Diaphragm Trench Pump.



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Reliable pumps were needed—pumps that could keep pace with the heavy infiltration day and night—with little attention.

So the
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DIAPHRAGM PUMPS

on the job and put it
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Our 3-inch Double Diaphragm
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Jump-spark ignition—sure fire and free from trouble. Built for unskilled labor to handle—all working parts accessible. Bored cylinders and cut steel gears, adjustable speed regulator—and a lot of other special features you should know. Engine and pump mounted on a stout, easily portable steel truck—a real contractor's pump.

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Steel Rails

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THE ENGINEERING AGENCY, Inc.
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Proposal.

For Welding Joints of a 36" Lock-Bar Steel Pipe Line.

Schenectady, N. Y.

Sealed proposals will be received by the Board of Contract and Supply of the City of Schenectady, N. Y., until 2:30 P. M., Wednesday, February 14, 1917, for furnishing all labor, materials and equipment and welding circumferential joints of approximately 10,200 feet of 36" Lock-Bar Steel Pipe.

The pipe is made from 5/16" and 3/8" plate and has approximately 387 single riveted lap joints to be welded, of which 137 are on the 5/16" plate and 244 on the 3/8" plate.

Pipe has been laid two years and has an average cover of 3½ feet, but has never been in service.

Specifications may be obtained from the Secretary of the Board of Contract and Supply, City Hall Annex, Schenectady, N. Y.

Each proposal must be accompanied by a certified check to the amount of 5% of the sum of the bid.

Both a construction and maintenance bond will be required.

The Board reserves the right to reject any and all bids.

BOARD OF CONTRACT AND SUPPLY,
F. J. Bates, Secretary.

FOR SALE BARGAINS

Compressors

3—Ingersoll-Rand Imperial Type XB2, capacity 2400' each; almost new.

1—Ingersoll Round Class C. J., cap. 900 feet.

Pumps

1—Snow Comp. Duplex, cap. 3,000,000 gallons per 24 hours; complete with condensers, air pumps, etc.; good as new.

1—Wilson-Snyder Comp. Cond. Duplex, cap. 3,000,000 per 24 hours; complete with condensers, etc.; good as new.

1—Dean Comp. Duplex, cap. 1,200,000; good as new.

Trench Machines

1—O Austin with caterpillar traction.

1—OO Austin with caterpillar traction.

1—5½ Buckeye with caterpillar traction.

1—Parsons, cuts 24" to 60" wide and 20' deep.

Write for additional lists.

George C. Marsh & Co.

749 OLD COLONY BLDG., CHICAGO
Tel. Harrison 6904.

Bids Wanted.

The Public Service Commission, Yazoo City, Miss., will receive bids for one 500-Kilowatt A. C. Generator and Engine until 11:00 A. M., Tuesday, February 20th, 1917. Right is reserved to reject any or all bids.

Specifications may be had on request.

JAS. S. BUTLER, Superintendent.

FOR SALE

10 ton Macadam Roller. Good shape, bargain. Continental Good Roads Co., Box 492, Albany, N. Y.

NOTICE.

The City Council of Great Falls, Montana, will receive Sealed Bids until 8 o'clock P. M., Tuesday, February 20th, for a Motor-Driven Combination Street Sprinkler and Sweeper. Bidders to furnish views and full description of their respective machines. All bids to be F.O.B. Great Falls, and addressed to W. H. HARRISON, City Clerk.

The Council reserves the right to reject any and all Bids.

TREASURY DEPARTMENT, Supervising Architect's Office, Washington, D. C., January 30, 1917.—Sealed proposals will be opened in this office at 3 p. m., March 14, 1917, for the construction of the United States post office at Statesboro, Ga. Drawings and specifications may be obtained from the custodian of the site at Statesboro, Ga., or at this office, in the discretion of the Supervising Architect, Jas. A. Wetmore, Acting Supervising Architect.

OFFICE OF THE STATE COMMISSION OF HIGHWAYS, ALBANY, N. Y.

Sealed Proposals will be received by the undersigned at their office, No. 55 Lancaster Street, Albany, N. Y., at 1 o'clock P. M. on Monday, the 19th day of February, 1917, for the construction of highways in the following counties:

ALBANY (one highway—1.45).
BROOME (two highways—5.35; 6.93).
CHAUTAUQUA (one highway—4.19).
CHENANGO (one highway—7.12).
CLINTON (one highway—5.95).
COLUMBIA (one highway—5.02).
CORTLAND (one highway—2.33).
ERIE (four highways—3.54; 0.91; 2.97; 5.26).
ESSEX (one highway—4.95).
FULTON (one highway—2.80).
HAMILTON (one highway—6.82).
HERKIMER (one highway—5.84).
*MONROE (one highway—2.73).
MONTGOMERY (one highway—3.63).
NIAGARA (one highway—0.61).
ONEIDA (two highways—6.15; 5.74).
OSWEGO (one highway—5.63).
RENSSELAER (one highway—6.34).
SARATOGA (one highway—9.06).
ULSTER (one highway—1.80).
WARREN (one highway—4.59).
WESTCHESTER (one highway—1.09).

*JEFFERSON (one highway, completion—4.60).
Sealed Proposals will also be received at 1 o'clock P. M. on Tuesday, February 20th, 1917, for the improvement of the following highways:

BROOME (two highways—3.78; 4.08).
CLINTON (one highway—3.34).
ERIE (four highways—2.90; 3.02; 2.34; 5.78).
ESSEX (one highway—8.85).
FULTON (one highway—4.90).
HAMILTON (one highway—6.74).
HERKIMER (one highway—5.67).
MONROE (one highway—4.58).
MONTGOMERY (one highway, completion—5.66).

NASSAU (one highway—2.99).
ONEIDA (two highways—0.45; 1.05).
OTSEGO (one highway—4.09).
RENSSELAER (one highway—4.95).
ROCKLAND (one highway—0.24).
ST. LAWRENCE (one highway—4.60).
SCHENECTADY (one highway—3.42).
SCHOHARIE (one highway—5.25).
SENECA (one highway—0.05).
SUFFOLK (one highway—11.58).
TOMPKINS (one highway—2.46).
ULSTER (one highway, completion—1.85).
WAYNE (one highway—1.88).

Also Broken Stone Contract No. 73, Onondaga and Wayne Counties—approx. 5,900 tons.

Maps, plans, specifications and estimates may be seen and proposal forms obtained at the office of the Commission in Albany, N. Y., and also at the office of the Division Engineers in whose division the roads are to be improved. The addresses of the division engineers and the counties in which they are in charge will be furnished on request.

The special attention of bidders is called to "GENERAL INFORMATION OF BIDDERS" on the itemized proposal, specifications and contract agreement.

EDWIN DUFFEY,
I. J. MORRIS, Commissioner.

Secretary.

**PROPOSAL ADS in
Municipal Journal
Bring Results**